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ELECTORAL OPPORTUNISM AND FISCAL POLICY BEFORE AND AFTER THE EMU

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Abstract

The adoption of a common currency in Europe, under the supervision of an independent European Central Bank, is likely to have had consequences on both the conduct of fiscal policy and the incentives to exploit political business cycles in each country. This work proposes a framework to analyze the influence of Central Bank Independence (CBI) on opportunistic political budget cycles before and after Economic and Monetary Union. We first focus on the situation before the EMU and present a model of opportunistic budget cycles in the presence of a central bank with a given level of independence. Secondly, we extend the model to the situation of the EMU to understand whether small countries take advantage of the fact that the one central bank setting monetary policy may under react to their own actions, offering policy-makers leeway to conduct opportunistic expansionary fiscal policies before elections. In a monetary union with a common central bank and opportunistic policy-makers the trade-off is between the degree of independence of the central bank and its inattentiveness to the smaller economies that are members of the monetary union. We present some empirical evidence that gives some supports to the main findings of the model by analyzing evidence from twelve countries of EMU over the period 1980-2012.

1 Introduction

The idea that politicians manipulate fiscal policy in order to enhance their prospects of being reelected has been widely studied and empirically tested. The concept of opportunistic political business cycle was introduced by Nordhaus (1975) and refers to the influence that the electoral manipulation of policy instruments can have on the real economy. However, due to the lack of empirical evidence in support of a political business cycle in terms of output, recent literature has focused instead on how fiscal policy is affected by electoral cycles, i.e. the issue of political budget cycles (henceforth PBC). Several studies support the existence of political budget cycles worldwide and also within the European Union and Economic and Monetary Union in Europe, namely Efthyvoulou (2012), Buti and Van der Noord (2003), Von Hagen (2003) and Mink and De Haan (2006). However, most of this literature is entirely empirical in nature and does not explore the relationship between Central Bank Independence (CBI) and opportunistic PBCs.

This work examines the influence of CBI on opportunistic political budget cycles at both a theoretical and an empirical level. We construct a model inspired in the setting of Economic and Monetary Union in Europe (EMU) to capture the interplay between a shift of the level of Central Bank Independence on how the fiscal policy is set at the country level, before electoral periods. Firstly, we focus on the situation before the EMU and we present a model of opportunistic budget cycles with an independent central bank. The aim of the model is to understand what is driving political budget cycles in the presence of a central bank with varying degrees of independence. In the second part, we extend the model to the setting of a monetary union, as in EMU, where monetary and fiscal policies are determined by two distinct authorities: a common central bank that sets monetary policy responding to the economic situation of the union as a whole, and an incumbent politician in a small country choosing fiscal policy in an election year. The key idea of this second model is to determine whether and how small countries in the union might take advantage of the fact that the central bank may overlook the specific economic conditions of the small country, thus conducting opportunistic expansionary fiscal policies in electoral periods.

To support empirically the main findings of our models, we examine twelve countries of EMU over the period 1980 to 2012. Using the general government budget balance as the fiscal policy indicator, we find empirical evidence of opportunistic PBCs, particularly after the countries have joined EMU. We also conclude that central bank independence influences positively fiscal policy - encouraging surpluses - as predicted in the theoretical model. In addition, we obtain that Germany´s economic cycle plays a crucial role in individual country budget balances only after the adoption of the common currency. Also, the smaller the size of a country´s economy relative to

that of Germany, the larger partner in the monetary union, the more fiscal policy-makers tend to indulge in budget deficits. We interpret our results as suggestive of the line of research and the model options proposed in this thesis.

The paper is organized as follows. In section 2 we briefly review the literature on political business cycles, previous empirical results about PBCs and central bank independence. In section 3 we present two models about the influence of central bank independence on political budget cycles. The first focuses on the case of one country with its own central bank, the second focuses on the case of the EMU, i.e. several countries and only one central bank that sets monetary policy. Section 4 presents empirical evidence of political budget cycles in twelve countries of the EMU. Section 5 concludes.

2 Literature Review

2.1 The Theory of Political Business Cycles

Political Business Cycle (PBC) models can be defined as models where business cycles are derived from political decisions by self-interested politicians that are either opportunistic - focused on getting reelected - or display a conflict over macroeconomic goals – inflation versus unemployment, different types of public spending, etc. The main purpose of the political business cycle literature is to study the effects of the political incentives above on the real economy, namely on GDP and unemployment. In other words, whether government policy choices, fiscal or monetary, driven by political incentives have an impact on the real economy. Within the literature of the PBCs we can distinguish a more specific literature on political budget cycles, studying the political incentives affecting government's fiscal policy decisions. Due to the lack of empirical evidence Political Business Cycles (Shi and Svensson, 2003) the literature has experienced a shift from the broader study of the real effects to the study of the political budget cycles.

As suggested above, PBC models can be divided in two main groups. On the one hand, we have opportunistic PBCs, where the business cycle results from the manipulation of policy tools by incumbent politicians – irrespective of policy preferences - to stimulate the economy before an election, and improve their chances of reelection. On the other hand, in partisan PBCs the business cycle results from the successive elections of administrations of different political parties with different preferences over inflation and unemployment, composition of public spending, or other.

Partisan PBC models are characterized by different parties with different preferences regarding economic issues and, therefore, different macroeconomic policy choices. Hibbs (1977) introduced

the partisan PBCs by examining postwar patterns in macroeconomic policies associated with left- and right-wing governments in capitalist democracies. He argued that these two types of government systematically differed in their perception of the relative costs of inflation and unemployment: right-wing government being more sensitive to the cost of inflation, and left-wing cabinets to the cost of unemployment. The major criticism to Hibbs´ was its anchor in an exploitable Phillips Curve, where expectations are not rational. Rational expectations were introduced into the partisan PBC models in Alesina (1987) emphasizing the role of policy uncertainty when we have two potential policymakers that can be elected, each with different policy preferences. The main conclusion was that, in the presence of price or wage stickiness, uncertainty about electoral outcomes can drive a political business cycle even with rational expectations. Although Alesina (1987) assumed an exogenous electoral results' probability, Alesina and Rosenthal (1995) extended the setup to a more general model where both the electoral result and the partisan cycle are taken as endogenous, with no consequences for the results.

Opportunistic PBC models were first introduced by Nordhaus (1975). They are characterized by a politician concerned only with winning the elections and holding office as long as possible. In the Nordhaus model, an incumbent facing a reelection directly controls inflation and is willing to distort policy in order to enhance her probability of winning. Voters are assumed to like growth, dislike inflation and unemployment, and are influenced by the economic performance in the period immediately before the election. Expectations of inflation are adaptive and not rational. As the incumbent moves to maximize his probability of staying in office through the control of monetary policy, in equilibrium she will stimulate the economy before the election via expansionary monetary policy. After the election, the need to bring down high inflation expectations makes the politician incur in contractionary monetary policy, leading to a post-electoral period of recession. The Nordhaus model was also criticized due to its reliance on political business cycles driven by non-rational voters, who are short-sighted in two dimensions: they have adaptive expectations about inflation and their voting behavior depends only on the incumbent past performance. In Nordhaus (1975), by the time of the new election voters have already forgotten the past recession and its causes, and respond only remembering the current boom that anticipates this next election.

The application of game theory to macroeconomics brought a reformulation of the opportunistic political business cycles models by incorporating a rational expectations framework. Several adverse selection-type of PBC models[1] were developed. Rogoff and Sibert (1988), Rogoff (1990) and Persson and Tabellini (1990) are the leading examples of this type of PBC models. Now, incumbent politicians and voters share the same utility function - i.e. both have exactly the same preferences

[1] Shi and Svensson (2003) use this designation that but in the context of political budget cycles.

regarding inflation, unemployment and government spending. In addition, all the models are also opportunistic in the sense the politician wants to win the elections, her welfare is increased by being in office and her goals do not have a partisan motivation. The main innovation of these adverse selection-type of opportunistic PBC models is their driving force: information asymmetries regarding the competence of the incumbent. That is, different politicians are assumed to have different degrees of competency and the politician has more information about her own degree of competency than the voters. These models of competence were introduced by Rogoff and Sibert (1988) and Rogoff (1990) in the context of political budget cycles, where it is assumed that more competent incumbents use fiscal revenues more efficiently by providing more public goods. Persson and Tabellini (1990) present a constructive extension to the political business cycles literature by considering that more competent incumbent politicians are able to achieve higher growth with lower unexpected inflation. In these models, pre-electoral manipulations of policy instruments are used by the incumbent politician as a signal of competence.

2.2 Empirical Evidence of PBCs

The first empirical studies on Political Business Cycles were focused on the United States. Tufte (1978) finds evidence of pre-electoral fiscal policy manipulation, through government transfers. Over time this work has been extended to other countries. Alesina, Roubini and Cohen (1992) study evidence of PBC models in 18 OECD economies from 1960 to 1987 using both the Nordhaus approach and the rational approach of Rogoff and Sibert (1988). They find very little evidence of pre-electoral effects on the economic activity, namely on GDP growth and unemployment. However, they observe some evidence of expansionary monetary policy in election years and of expansionary fiscal policy prior to elections - evidence they emphasized as being significant though not extremely strong and interpreted as the politicians' concern about that their reputation which constrains the frequency of pre-electoral manipulation of the economic policy. Moreover, these authors noticed that inflation exhibits a post-electoral jump, which could be due both to pre-electoral fiscal or monetary expansions and to an opportunistic timing of increases in publicly controlled prices, or indirect taxes.

Alesina, Roubini and Cohen (1997) find evidence to support partisan but not opportunistic business cycles in the United States, between the years of 1947 and 1994. They observed regular differences between Democratic and Republican administrations with respect to growth rates, average inflation rates, and the unemployment rate, consistent with the predictions of rational partisan theory. On the other hand, the authors do not find evidence of expansionary monetary policy during election years or pre-electoral manipulation of fiscal policy. The exception is the year

1972, of the well-know reelection of Richard Nixon as president of the US, many times mentioned as a prototypical example of the Nordhaus model at work. In this work, the authors also study 18 OECD countries in the period between 1960 and 1993 and obtain similar results to those for the United States, i.e. they find evidence supportive of the rational partisan model, particularly in countries with a two-party political system, and again no evidence to support opportunistic models.

As previously mentioned, the literature on political business cycles has recently focused on fiscal instruments rather than on outcome variables such as growth, inflation or unemployment. Persson and Tabellini (2002) investigate whether fiscal policy variables, such as total spending, revenue, deficits and welfare-state spending, exhibit electoral cycles and whether these cycles are affected by the political regime in place. These authors analyze 60 democracies over the period 1960-98 to find that, independently of the political regime, taxes are cut before elections, painful fiscal adjustments are postponed until after the elections, and that there is no electoral cycle on welfare-state spending. They also conclude that all types of governments tend to conduct pre-electoral tax cuts, while presidential democracies are alone in making post-election fiscal adjustments. Another interesting conclusion was that spending cuts before elections are associated to majoritarian electoral systems, whereas expansions of welfare spending both before and after elections are associated with proportional electoral systems. Another relevant study is that by Shi and Svensson (2006), which presents evidence of political budget cycles for a large panel data set comprising 85 countries over the period 1975 to 1995. The authors find that government fiscal deficits increase by one percent of GDP, on average, in election years. However, these budget cycles are large in developing countries and small or nonexistent in developed countries.

Another growing strand of the literature focuses on evidence of political budget cycles in developing countries. In a brief review, it was found evidence of PBCs namely in Mexico (Gonzalez, 2002), India (Khemani, 2004), and in 44 Sub-Saharan African countries (Block, 2002). Furthermore, Brender and Drazen (2005a, 2007) demonstrate that in established democracies voters should punish politicians conducting opportunistic fiscal policies during elections and, therefore, there should exist political budget cycles only in "new democracies". These findings suggest that fiscal manipulation may have good results in "new democracies" due to the lack of "voter sophistication", that is, lack of experience with electoral politics or lack of information that is available in established democracies and used by experienced voters. Hence, as showed by Brender (2003), voters will reward conservative fiscal policies as they become more sophisticated and informed, i.e. they will become more "fiscal conservatives". However, Brender and Drazen (2005b) use a large cross-section of countries to test whether good economic conditions or expansionary fiscal policy

help incumbents to be reelected and find no evidence that an increase in fiscal deficits enhance the politician's reelection prospects, even in "new democracies". In the same line, Arvate, Avelino and Tavares (2009) test how voter "sophistication" relates with "fiscal conservativeness" using electoral data from Brazil between 1990 and 2002, a period in which this country could be considered a "new democracy". These authors use schooling years as a proxy for voter's "sophistication" - so that voters with less years of education are considered "naïve"- and find no evidence that voters, "sophisticated" or "naïve", reward deficits at the polls. In addition, they find that high raked states in schooling years actually seem to reward fiscal surpluses. These findings complement Brender and Drazen (2005b) by suggesting the use of proxies for voter sophistication and analyzing how a change in institutional environment affects perceptions of fiscal policy and voter behavior.

On the other hand, recent studies support the existence of PBCs in established democracies. For example, Tujula and Wolswijk (2004) study OECD countries between 1970 and 2002 and find evidence supportive of PBCs. Alt and Lassen (2006) study how fiscal transparency and political polarization influences the existence of political budget cycles. Their analysis of 19 OECD countries in the 1990s shows that in countries with lower transparency there are clear signs of electoral cycles, whereas in countries with higher transparency there is no evidence of cycles. They also find that cycles are larger in countries with more political polarization.

As to the study of political cycles in the European Union (EU) and, more specifically, the Economic and Monetary Union in Europe, several studies find evidence of its existence. Buti and Van der Noord (2003) examined EMU countries over the period 1999-2002 and concluded that the "electoral budget cycle is alive and well in EMU". These authors demonstrate that the budgetary discipline requirements of the Stability Growth Pact (SGP) are not sufficient to restrain opportunistic expansionary pre-electoral fiscal policies, that is, the costs of breaking the fiscal rules are smaller than the short-term gains of indulging in higher deficits. Von Hagen (2003) also analyzed the fiscal behavior of EMU countries and reached a similar conclusion: governments use fiscal policy as an instrument to support their electoral interests. Finally, a more recent study by Mink and De Haan (2006) examines countries in the euro area during the period of 1999-2004 to find strong evidence of expansionary fiscal policies in years prior to elections, indicating that the SGP had made the politicians to curb electoral manipulation of fiscal instruments.

2.3 Central Bank Independence

Central bank independence can be defined as the inverse of the degree of influence the government has over the conduct of monetary policy, i.e. a measure of how autonomous is the central bank. According to Hasse (1990) central bank independence can be measured in three main areas where

the influence of government should be prohibited or significantly reduced: personnel independence - the influence the government has in the governing body of the central bank; financial independence - the ability of the government to finance its expenditures through central-bank credits; and, finally, policy independence – the autonomy of the central bank to determine the monetary policy. In what concerns policy independence, it is also important to distinguish independence with respect to goals and to instruments (Debelle and Fischer, 1994; Fischer, 1995). The former relates to the autonomy of the central bank to follow his own objectives, and the latter refers to the room of maneuvering that the central bank has in deciding how to achieve its goals.

A common argument regarding central bank independence is that countries with independent central banks present lower levels of inflation than countries where the government directly controls the monetary policy. In the literature there were put forward three main explanations for this fact (Eijffinger and De Haan, 1996), based on public-choice arguments, on the relationship between fiscal and monetary authorities, and on the issue of time-inconsistency. The first refers to the strong political pressures that can be exerted on the monetary policy to comply with the politicians wills. This argument is closely related with the partisan and opportunistic theories described above, i.e. political business cycles driven by monetary policy. Generally, a more independent central bank will not succumb as much to these political pressures. The arguments based on the relationship between fiscal and monetary policy were introduced by Sargent and Wallace (1981) and state that more independent central banks will not finance fiscal deficits by creating money. Finally, the most important arguments are based on the time-inconsistency problem, as in Kydland and Prescott (1977), Calvo (1978) and Barro and Gordon (1983), and are centered on the general debate of rules versus discretion. Kydland and Prescott (1977) argue that discretionary monetary policies can lead to inefficiently high inflation. They argue that when expected inflation low, the marginal cost of additional inflation is low and consequently expansionary policies will be conducted in order to raise output above its normal level. However, if agents are rational they know that policymaker have this incentive and, therefore, they will not expect low inflation. Hence, if policymakers pursue discretionary policies there would be inflation without any increase in output. Similarly, Barro and Gordon (1983) state that when monetary policy can be anticipated the rate of unemployment can be reduced but the government would not be able to commit to low inflation and, therefore, inflation would be sub-optimally high. Several solutions were offered to solve the time- inconsistency problem, namely through the delegation to a conservative central banker (Rogoff, 1985) or to an independent policymaker with suitable incentives and a well-specified mandate - the "contracting" approach to central banking (Persson and Tabellini, 1993; Walsh, 1995). Another solution to address the time-inconsistency of problem is the reputation

approach which was formally introduced by Backus and Driffill (1985) and Barro (1986). This approach is based on the public uncertainty regarding the policy preferences of the central bank. Under this uncertainty, what determines the public's expectations of inflation is the central bank behavior and so the lower is the inflation observed today, the lower are public's expectations of inflation in the following periods. This solves the time-inconsistency problem by giving the central incentives to pursue low-inflation policies. Lastly, the adoption of a credible currency is also considered an efficient way to overcome the time-inconsistency problem. The issue of optimal currency areas was first studied by Mundell (1961) and is pointed out as the result of two countervailing forces: the benefits in facilitating trade in goods, services and financial transaction, and the loss of independent monetary policy that cannot be tailored to each country's disturbances. Alesina and Barro (2002) extend Mundell's framework and incorporate it in the discussion of rules versus discretion in monetary policy by considering that adhering to a currency union can commit a country to monetary stability, which is especially attractive to countries that lack internal discipline. In other words, the authors show that the adoption of the currency of a low-inflation anchor can solve the time-inconsistency problem by the gain credibility and consequent reduction of undesired inflation.

In theoretical models, central bank independence is frequently represented by the weight central bank preferences give to price stability over output. A central bank is considered conservative when it places a higher weight on inflation than the politicians or the public (Rogoff, 1985). The idea is that independent central banks follow a policy of low and stable inflation that is not usually the preferred by incumbent politicians. In Rogoff (1985), the central banker cares relatively more about inflation and less about output than society, and the main conclusion is that it would be socially optimal to have the conservative central banker setting the monetary policy.

2.4 Central Bank Independence and Political Business Cycles

In the presence of an independent central bank the political business cycles cannot be driven by monetary policy since it is not controlled by the incumbent politicians. Alesina and Gatti (1995) study the effect of central bank independence on partisan political business cycles, by extending the rational partisan model of Alesina (1987). The authors introduce output shocks and the possibility of delegation of monetary policy to an independent central bank that cares more about price stability, i.e. conservative. The main idea is that the political uncertainty that is driven the output fluctuations in Alesina (1987) can be eliminated by delegating the monetary policy to an independent central banker before the election who cannot be removed from office. Hence, the delegation to an independent central bank has the advantage of eliminating the inflation bias and

the policy uncertainty and consequently bringing down the variance of inflation and output.

In Rogoff (1985) the delegation to an independent and inflation-averse central banker reduces the average inflation at the cost of higher output variability. Conversely, in Alesina and Gatti (1995) by delegating to an independent central bank the monetary policy is insulated from the partisan cycles and, therefore, the politically induced variance in output is eliminated. This allows the economy to achieve simultaneously lower inflation and output stabilization when an independent central bank reduces political variability via a monetary policy insulated from political pressures.

3 Model: Electoral Opportunism and Fiscal Policy Before and After the EMU

3.1 Benchmark Model – One Country One Central Bank

Here we present a one country model of opportunistic budget cycles in the presence of a central bank with varying degrees of independence. The main aim of this model is to understand what drives these political budget cycles under the influence of a central bank which decides monetary policy.

Monetary and the fiscal policies are determined by two distinct authorities: a central bank sets monetary policy, and an incumbent politician decides over fiscal policy. The incumbent politician faces an election and wants to remain in office. This is an opportunistic two period model: in the first period the incumbent is facing an election and wants to use fiscal policy to enhance his probability of reelection; in the second period, after election, the politician may remain in office or become a regular citizen.

The model is an extension of a simplified version of the conservativeness model of Rogoff (1985), adding shocks to an opportunistic political business cycles framework. On the one hand, as in Rogoff (1985), we have a central banker who is more inflation-averse than the incumbent politician. On the other hand, this is an opportunistic model as the politician cares about winning the election since his welfare increases by being in office.

We present next how the monetary and fiscal policies are formulated.

3.1.1 The Monetary Authority - Optimal Monetary Policy under Discretion

The monetary policy is determined by a central banker that has discretion over the choice of inflation. The utility of the central bank is given by the following expression:

$$U^{CB} = c\gamma_t y_t - \alpha \frac{\pi_t^2}{2} \tag{1}$$

where: γ_t is a random variable with mean $\overline{\gamma}_t$ and variance σ_γ^2; y_t is the level of output; π_t is the level of inflation; α is the weight of inflation relative to output; and $0 < c < 1$ defines the degree of "conservativeness" of the central bank - a more "conservative" central bank has a low c, that is, she cares relatively more about curbing inflation.

Moreover, it is assumed that expectations of inflation are determined before γ_t is realized.

The aggregate supply is given by:

$$y_t^s = \lambda \left(\pi_t - \pi_t^e\right) \tag{2}$$

where: y_t is the level of output; π_t is the level of inflation; π_t^e the expected level of inflation; and λ the elasticity of output with respect to deviations of inflation from its expected level.

The intuition behind this condition is given by the work of Lucas (1972) and Phelps (1970) on the microeconomic foundations of employment and inflation. This condition is also denoted by Lucas "surprise" supply function and is based on the Lucas Imperfect-Information model. In this model, producers do not observe the aggregate price level and, consequently, their production decisions are made without knowing the relative prices of their goods. In other words, when the price of the product changes, the producer cannot distinguish if it reflects a change in the good's relative price or a change in the aggregate price level. However, a change in the relative price influences the optimal amount to produce, contrarily to a change in the aggregate price level. When the price of the producer's good increases it can reflect a rise in the good's relative price or in the price level, then the rational response for the producer is to attribute part of the change to an increase in the relative price and part to an increase in the price level, and so to increase the output to some extent. Therefore, the aggregate supply is affected positively by an increase in the aggregate price level because all producers see an increase in the price of their goods and, not knowing the cause, will always raise their output. For this reason, the Lucas supply function states that the deviation of output from its normal level (which in the model is zero) is an increasing function of the surprise in the price level.

The central bank chooses π that maximizes its utility function subject to the aggregate supply relation:

$$\max_{\pi_t} \quad c\gamma_t y_t - \alpha\frac{\pi_t^2}{2} \tag{3}$$

$$s.t. \qquad y_t^s = \lambda\left(\pi_t - \pi_t^e\right) \tag{4}$$

Solving this problem[2] we obtain the **optimal level of inflation for the central bank**:

$$\pi_t = \frac{c\lambda}{\alpha}\gamma_t \tag{5}$$

This expression tells us that the optimal level of inflation depends positively on the shock γ_t and on the value of c. Thus, higher levels of inflation are optimal for a less independent (or conservative) central bank, represented by a higher value of c.

3.1.2 The Politician - Optimal Fiscal Policy and the Optimal Level of Debt

Utility The incumbent politician is assumed to care about the social welfare of the voter and about being in office. This latter characteristic is what makes this model an opportunistic political budget cycle model as electoral motivations affect the formulation of the optimal fiscal policy, in a way that is independent of ideology.

The social welfare of the voters, u^V, depends on the general state of the economy, i.e. voters like growth and dislike inflation:

$$u_t^V = \gamma_t y_t - \alpha\frac{\pi_t^2}{2} \tag{6}$$

The welfare of the voters is given by a similar expression to the one of the central bank. However, the main difference is the on the value of c, which is in this case is assumed to be equal to 1, implying that voters place more weight on output than the central bank.

It is also assumed that the politician's welfare increases when she is in office and the extra welfare is represented by the parameter $\phi > 0$. Since being in office as the chief administrator is considered a great honor, Rogoff (1990) denote these benefits as "ego rents". However, this extra welfare might be also influenced by corrupt motives, such as receiving bribes or future jobs in private sector.

In the first period, at $t = 1$, the politician is in office and is facing an election. Hence, her utility is given by:

[2] See algebra in section 1.1 of Appendix I.

$$U_1^{PE} = u_1^V + \phi \tag{7}$$

$$= \gamma_1 y_1 - \alpha \frac{\pi_1^2}{2} + \phi \tag{8}$$

In words, the utility of the politician elected in the first period, U_1^{PE}, is equal to the utility of voters in that period, u_1^V, plus the benefits of holding office, ϕ.

In the second period, $t = 2$, after the elections, two possible situations can occur:

i) The politician is reelected and her utility is given by:

$$U_2^{PE} = u_2^V + \phi \tag{9}$$

$$= \gamma_2 y_2 - \alpha \frac{\pi_2^2}{2} + \phi \tag{10}$$

ii) The politician is not reelected his utility is given by:

$$U_2^{PNE} = u_2^V \tag{11}$$

$$= \gamma_2 y_2 - \alpha \frac{\pi_2^2}{2} \tag{12}$$

The utility of the politician non-elected in the second period, U_2^{PNE}, is exactly equal to the utility of the voters in that period, u_2^V. The intuition behind this condition is given by the fact that for the politician not being elected means to become a regular voter again and so not being able to benefit from the advantages of holding office.

It is assumed that the incumbent politician will be reelected with a probability p, which depends positively on the output in the election year, y_1:

$$\frac{\partial p(y_1)}{\partial y_1} > 0 \tag{13}$$

This assumption is supported by numerous studies in the literature that find empirical evidence for the hypothesis that good economic conditions in the year of election enhance the politician's prospects of reelection. Kramer (1971) Tufte (1975) and Fair (1978) [updated in Fair (1982, 1988)] studied the case of the United States and concluded that aggregate economic conditions before an

election, specifically per capita output or income growth, have a significant effect on voting patterns - for example, Fair (1978) found that a 1% raise in the growth rate increases the incumbent's vote total by about 1%. Several other articles find similar results in both the United States and other countries, namely Lewis-Beck (1988) found these results holding in Britain, France, West Germany, Italy, and Spain, and Madsen (1980) in Denmark, Norway, and Sweden.

Therefore, **the intertemporal utility of the politician** is given by:

$$U^P = U_1^{PE} + \beta E_1 \left\{ p(y_1) U_2^{PE} + [1 - p(y_1)] U_2^{PNE} \right\} \tag{14}$$

Or equivalently:

$$U^P = \gamma_1 y_1 - \alpha \frac{\pi_1^2}{2} + \phi + \beta E_1 \left\{ \gamma_2 y_2 - \alpha \frac{\pi_2^2}{2} + p(y_1)\phi \right\} \tag{15}$$

where:

β is the discount factor, with $0 < \beta < 1$

Aggregate Demand The aggregate demand is assumed to be given by:

$$y_t^d = m g_t \tag{16}$$

where g_t represents government expenditures and m is the fiscal multiplier which we assume to be positive, $m > 0$. This last assumption is based on the work of Spilimbergo, Symansky and Schindler (2009) where is presented a complete survey of fiscal multipliers in the literature and estimates of multipliers for numerous countries. Regarding the issue of which fiscal multiplier to use in specific applications, the authors state that the rule of thumb is a multiplier of 1.5 to 1 for spending multipliers in large countries, 1 to 0.5 for medium sized countries, and 0.5 or less for small open countries.

Budget Constraint The politician determines the level of public expenditure g each period by choosing the level of debt d. Considering that this is a two-period model, it is assumed that the politician can only contract debt in the first period and it must be fully repaid (with interest) in

the next period. Hence, the level of public expenditure each period is given by:

$$g_1 = W + d \tag{17}$$

$$g_2 = W - (1 + i^l)d \tag{18}$$

where W is the government endowment, consisting of fixed tax receipts, and i^l is the long-term interest rate on debt. For simplicity, we will assume that government endowment is zero, $W = 0$, so that:

$$g_1 = d \tag{19}$$

$$g_2 = -(1 + i^l)d \tag{20}$$

Since in first period the politician is facing a reelection, she has greater incentives to issue a substantially high level of debt in order to improve the economic conditions and, therefore, enhance her prospects of being reelected. However, the requirement to fully repay any debt issued if reelected inhibits the politician to engage in an abnormal expansionary fiscal policy during the election year. Thus, when deciding the optimal amount of debt, the politician faces a trade-off between the improvement of her reelection probability and a more painful obligation to pay.

Optimal Fiscal Policy and Level of Debt The politician's only fiscal policy instrument is the level of debt, thus the optimal fiscal policy during the election year is determined by choosing how much debt, d, to issue. And for this decision she must take into account the trade-off between the enhancement of her reelection prospects and a more painful obligation to meet. Hence, the incumbent politician's problem is given by the maximization of her intertemporal utility with respect to d subject to the aggregate supply, aggregate demand and budget constraint, of both

period one and period two:

$$\max_d U^P = \gamma_1 y_1 - \alpha\frac{\pi_1^2}{2} + \phi + \beta E_1\left\{\gamma_2 y_2 - \alpha\frac{\pi_2^2}{2} + p(y_1)\phi\right\} \tag{21}$$

$$\text{s.t.} \qquad \pi_1 = \frac{1}{\lambda}y_1^s + \pi_1^e \tag{22}$$

$$\pi_2 = \frac{1}{\lambda}y_2^s + \pi_2^e \tag{23}$$

$$y_1^d = mg_1 \tag{24}$$

$$y_2^d = mg_2 \tag{25}$$

$$g_1 = d \tag{26}$$

$$g_2 = -(1+i^l)d \tag{27}$$

Solving this problem, in equilibrium, we obtain[3]:

$$d = \upsilon_d\beta\frac{\partial p(y_1)}{\partial y_1}\phi + \upsilon_d\gamma_1 - \upsilon_d\frac{\alpha}{\lambda}\pi_1^e - \upsilon_d\delta\overline{\gamma}_2 + \upsilon_d\frac{\alpha}{\lambda}\delta\pi_2^e \tag{28}$$

where:

$$\upsilon_d = \frac{\lambda^2}{m\alpha\left(1+(1+i^l)\delta\right)} > 0 \qquad \text{and} \tag{29}$$

$$\delta = (1+i^l)\beta \tag{30}$$

υ_d consists of only exogenous parameters of the model and has always a positive sign. Moreover, given the parameters that it comprises, υ_d can be considered as a kind of "discount factor" in this expression.

The only endogenous parameters in the expression above of the optimal level of debt are the levels of expected inflation in the first and second period, which are determined by the optimal monetary policy. And, in the model, the central bank sets monetary policy by choosing the optimal level of inflation. Hence, assuming rational expectations, the expected level of inflation each period is given by:

$$\pi_t^e = E\left[\pi_t\right] = E\left[\frac{c\gamma_t\lambda}{\alpha}\right] = \frac{c\lambda}{\alpha}E\left[\gamma_t\right] = \frac{c\lambda}{\alpha}\overline{\gamma}_t \tag{31}$$

By substituting the respective values into the last expression, we obtain the **optimal level of debt**:

$$d = \upsilon_d\beta\frac{\partial p(y_1)}{\partial y_1}\phi + \upsilon_d\left(\gamma_1 - c\overline{\gamma}_1\right) - \upsilon_d\left(1-c\right)\delta\overline{\gamma}_2 \tag{32}$$

[3]See algebra in section 2.1 of Appendix I

Comparative Statics In order to better understand what determines the fiscal policy in an election year, we proceed to the analysis of how the optimal level of debt responds to changes in:

i) the sensibility of the probability of reelection with respect to output:

$$\frac{\partial d}{\partial \left[\frac{\partial p(y_1)}{\partial y_1}\right]} = \frac{\lambda^2 \beta}{m\alpha\left(1+(1+i^l)\delta\right)}\phi > 0 \tag{33}$$

The higher is the sensibility of the probability of reelection with respect to output the higher will be the level of debt. Thus, if the probability of reelection reacts more to the economic conditions, the politician will be more tempted to increase debt in order to enhance his prospects of being reelected. Moreover, this effect is stronger the more the politician's utility improves by being in office, i.e. for higher values of ϕ. This condition supports the existence of opportunistic budget cycles in our model.

ii) the additional utility the politician derives from being in office is:

$$\frac{\partial d}{\partial \phi} = \frac{\lambda^2 \beta}{m\alpha\left(1+(1+i^l)\delta\right)}\frac{\partial p(y_1)}{\partial y_1} > 0 \tag{34}$$

The higher is the extra welfare that the politician gets from being in office the higher will be the level of debt. This is also an important condition for our model, since we can conclude that the political budget cycles will be more pronounced the more the politician benefits from being in office.

iii) Shock in the first period:

$$\frac{\partial d}{\partial \gamma_1} = \frac{\lambda^2}{m\alpha\left(1+(1+i^l)\delta\right)} > 0 \tag{35}$$

The intuition behind this condition is given by the role of the shock in the first period, γ_1, in the politician's intertemporal utility function. Since γ_1 represents the impact of output in the first period on the intertemporal utility function, a higher value augments the politician's incentives to engage in expansionary fiscal policies during the election year.

iv) Mean of the shock:

a) in the first period:

$$\frac{\partial d}{\partial \overline{\gamma}_1} = -\frac{\lambda^2}{m\alpha\left(1+(1+i^l)\delta\right)}c < 0 \tag{36}$$

An increase in $\overline{\gamma}_1$ implies, for a given c, an increase of expected inflation in the first period and a consequent reduction of the politician's intertemporal utility. However, this effect is attenuated

by having a more conservative (or independent) central bank that keeps inflation lower on average. Thus, it will be optimal for the politician to contract a lower level of debt so that the negative impact of $\overline{\gamma}_1$on her intertemporal utility is not amplified by further inflationary pressures.

b) in the second period:

$$\frac{\partial d}{\partial \overline{\gamma}_2} = -\frac{\lambda^2}{m\alpha\left(1+(1+i^l)\delta\right)}\delta\left(1-c\right) \tag{37}$$

$$\frac{\partial d}{\partial \overline{\gamma}_2} < 0 \text{ since } c < 1 \tag{38}$$

There are two main factors behind the intuition of this condition. An increase in $\overline{\gamma}_2$ implies a loss in the politician's intertemporal utility function both through the impact of y_2 and π_2^e. Whether the politician attenuates this loss by engaging in contractionary or expansionary fiscal policies depends on which of these two effects is stronger. The effect via expected inflation is attenuated by having a more conservative (or independent) central bank that keeps inflation lower on average. Thus, the impact of a recession in the second period is necessarily stronger and so it is optimal for the politician to contract a lower level of debt as a response to an increase in $\overline{\gamma}_2$.

v) the degree of central bank independence (or conservativeness):

$$\frac{\partial d}{\partial c} = -\frac{\lambda^2}{m\alpha\left(1+(1+i^l)\delta\right)}\overline{\gamma}_1 + \frac{\lambda^2\delta}{m\alpha\left(1+(1+i^l)\delta\right)}\overline{\gamma}_2 \tag{39}$$

$$= \frac{\lambda^2}{m\alpha\left(1+(1+i^l)\delta\right)}\left(\delta\overline{\gamma}_2 - \overline{\gamma}_1\right) \tag{40}$$

$$\frac{\partial d}{\partial c} > 0 \text{ iff } \delta\overline{\gamma}_2 > \overline{\gamma}_1 \tag{41}$$

A lower level of central bank independence implies higher levels of expected inflation in both periods. Thus, the politician's decision about following expansionary or contractionary fiscal policies depends on her expectations of whether inflation will be higher in the first or the second period. If the politician expects higher inflation in the first period then she will contract a lower level of debt in order to avoid any further inflationary pressures, while if the expectation of inflation is higher in the second period she will engage in expansionary policies to counterbalance the negative impact of inflation on her intertemporal utility. And, for a given value of c, expectations about inflation depend on the mean of the shocks, i.e. expected inflation is higher in the second period if and only if the mean of shock in the second period is higher than mean of the shock in the first period, and vice-versa.

We study conditions iv) and v) in further detail in section 3.3.

vi) the fiscal multiplier:

$$\frac{\partial d}{\partial m} = -\frac{\lambda^2}{m^2\alpha\left(1+(1+i^l)\delta\right)}\left[\beta\frac{\partial p(y_1)}{\partial y_1}\phi + (\gamma_1 - c\overline{\gamma}_1) - (1-c)\,\delta\overline{\gamma}_2\right] \tag{42}$$

$$= -\frac{1}{m}d \tag{43}$$

$$\frac{\partial d}{\partial m} < 0 \text{ iff } d > 0 \tag{44}$$

The intuition of this condition is given by the relationship between the fiscal multiplier and the politician's intertemporal utility. Having a higher fiscal multiplier implies a greater impact of a change in the level of debt on the level of output. Hence, with a higher value of m it will be optimal for the politician to follow a not so expansionary fiscal policy, since an increase debt implies now a stronger improvement of her intertemporal utility.

vii) the elasticity of output with respect to deviations of inflation from its expected level:

$$\frac{\partial d}{\partial \lambda} = \frac{2\lambda}{m\alpha\left(1+(1+i^l)\delta\right)}\left[\beta\frac{\partial p(y_1)}{\partial y_1}\phi + (\gamma_1 - c\overline{\gamma}_1) - (1-c)\,\delta\overline{\gamma}_2\right] \tag{45}$$

In this case, the sigh of $\frac{\partial d}{\partial \lambda}$ is ambiguous because it depends on the interaction between the political factors, the shocks and the expected shocks accommodated by the central bank.

viii) the discount factor:

$$\frac{\partial d}{\partial \beta} = \frac{\lambda^2}{m\alpha\left(1+(1+i^l)^2\beta\right)^2}\left[\frac{\partial p(y_1)}{\partial y_1}\phi - (1+i^l)^2(\gamma_1 - c\overline{\gamma}_1) - (1-c)\,(1+i^l)\overline{\gamma}_2\right] \tag{46}$$

Once again, the sigh of $\frac{\partial d}{\partial \beta}$ is ambiguous because it depends on the interaction between the political factors, the shocks, the expected shocks accommodated by the central bank and the interest rate paid on debt.

ix) the long-term interest rate:

$$\frac{\partial d}{\partial i^l} = -\frac{2(1+i^l)\lambda^2}{m\alpha\beta\left(1+(1+i^l)\delta\right)^2}\left[\beta\frac{\partial p(y_1)}{\partial y_1}\phi + (\gamma_1 - c\overline{\gamma}_1) + \left(1-\frac{\delta}{2}\right)(1-c)\,\overline{\gamma}_2\right] \tag{47}$$

The sigh of $\frac{\partial d}{\partial i^l}$is also ambiguous, depending once again on the interaction between the political factors, the shocks, the expected shocks accommodated by the central bank and the discount factor δ.

3.2 Opportunistic Budget Cycles in the European Monetary Union

We now extend the model to the situation of the EMU where we have an independent central bank that sets monetary policy, taking into account the economic situation of the union as a whole, and an incumbent politician of a small country in the EMU, choosing fiscal policy in an election year. The key idea now is to understand whether a small country in the union can take advantage of the fact that the central bank setting may be relatively inattentive to the small country, which can give the fiscal policy maker more leeway for opportunistic behavior. In other words, a small country adhering to a monetary union with a more conservative central banker may see their incentives for fiscal opportunism increase if the common central bank is relatively inattentive to the small country's economic conditions.

3.2.1 The Monetary Authority - Optimal Monetary Policy under Discretion

The monetary policy is determined by the European central bank that has discretion over the choice of inflation. The utility of the central bank is given by the following expression:

$$U^{CB} = c\gamma_t^U y_t^U - \alpha \frac{\left(\pi_t^U\right)^2}{2} \tag{48}$$

where: γ_t^U is a random variable with mean $\overline{\gamma}_t^U$ and variance σ_γ^2; y_t^U is the level of output of the union; π_t^U is the level of inflation; α is the weight of inflation relative to output; and $c > 0$ defines the degree of "conservativeness" of the central bank - a more "conservative" central bank has a low c, that is, she cares relatively more about curbing inflation.

As before, the aggregate supply is given by the Lucas supply curve:

$$\left(y_t^L\right)^s = \lambda \left(\pi_t^L - \left(\pi_t^e\right)^L\right) \tag{49}$$

where: y_t^U is the aggregate level of output in the monetary union; π_t^U is the level of inflation in the monetary union; $\left(\pi_t^e\right)^U$ the expected level of inflation in the monetary union; and λ the elasticity of output with respect to deviations of inflation from its expected level.

We assume that the central bank sets monetary policy only taking in to account the economic situation of the larger country in the union ($i = L$). Thus, the central bank chooses π^L in order to maximize the welfare subject to the large country's aggregate supply relation:

$$\max_{\pi_t^L} \quad c\gamma_t^L y_t^L - \alpha \frac{\left(\pi_t^L\right)^2}{2} \tag{50}$$

$$s.t. \qquad \left(y_t^L\right)^s = \lambda\left(\pi_t^L - \left(\pi_t^e\right)^L\right) \tag{51}$$

Solving this problem[4] we obtain the **optimal level of inflation for the central bank**:

$$\pi_t^L = \frac{c\lambda}{\alpha}\gamma_t^L \tag{52}$$

As in the benchmark model, this expression tells us that the optimal level of inflation depends positively on the random variable or shock and on the value of c. Thus, higher levels of inflation will be optimal for a less independent (or conservative) central bank, represented by a higher value of c. However, the central bank in the monetary union is only accommodating the shocks of the large country, γ_t^L.

3.2.2 The Politician

Utility Similarly to the benchmark model, it is considered that the incumbent of country i cares about the social welfare of voters and about being in office. The welfare of the voters is given by a similar expression to the one of the central bank, with the only difference being once again the value of c, assumed to be equal to 1, implying that voters place more weight on output than the central bank. As before, it is also assumed that the welfare of country i's politician increases when she is in office and the extra welfare is represented by the parameter $\phi_i > 0$. Hence, **the intertemporal utility of the politician of country** i is given by:

$$U_i^P = \gamma_{i,t}y_{i,1} - \alpha\frac{\pi_{i,1}^2}{2} + \phi_i + \beta E_1\left\{\gamma_{i,t}y_{i,2} - \alpha\frac{\pi_{i,2}^2}{2} + p(y_{i,1})\phi_i\right\} \tag{53}$$

where β is the discount factor, with $0 < \beta < 1$.

Furthermore, it is also maintained the assumption that good economic conditions in the year of election enhance the politician's prospects of reelection, i.e. $\frac{\partial p(y_{i,1})}{\partial y_{i,1}} > 0$.

Aggregate Demand The aggregate demand is given by:

$$y_{i,t}^d = m_i g_{i,t} \tag{54}$$

where g_t represents government expenditures of country i and m_i is the fiscal multiplier of country i which we, once again, assume to be positive, $m_i > 0$.

[4] See algebra in section 1.1 of Appendix II

Budget Constraint As in the benchmark model, the politician of country i determines the level of public expenditure g_i each period by choosing the level of debt d_i. Here, it is also maintained the assumption that the politician can only contract debt in the first period and it must be fully repaid (with interest) in the next period. For simplicity, we assume that government endowment is zero, $W = 0$. Hence, the level of public expenditure each period is given by:

$$g_{i,1} = d_i \tag{55}$$

$$g_{i,2} = -(1 + i_i^l)d_i \tag{56}$$

where i_i^l is the long-term interest rate on debt paid by country i.

So, similarly to the previous model, the politician's choice of the optimal amount of debt implies a trade-off between the improvement of her reelection probability and a more painful obligation to pay.

Optimal Fiscal Policy The only fiscal policy instrument of country i's politician is the level of debt, thus the optimal fiscal policy during the election year is determined by choosing how much debt, d_i, to issue. And for this decision she must take into account the trade-off between the enhancement of her reelection prospects and a more painful obligation to meet. Hence, the problem of the incumbent politician in country i is given by the maximization of her intertemporal utility with respect to d_i subject to the aggregate supply, aggregate demand and budget constraint,of both period one and period two:

$$\max_{d_i} U_i^P = \gamma_{i,t} y_{i,1} - \alpha \frac{\pi_{i,1}^2}{2} + \phi_i + \beta E_1 \left\{ \gamma_{i,t} y_{i,2} - \alpha \frac{\pi_{i,2}^2}{2} + p(y_{i,1})\phi_i \right\} \tag{57}$$

$$\text{s.t.} \quad \pi_{i,1} = \frac{1}{\lambda} y_{i,1}^s + \pi_{i,1}^e \tag{58}$$

$$\pi_{i,2} = \frac{1}{\lambda} y_{i,2}^s + \pi_{i,2}^e \tag{59}$$

$$y_{i,1}^s = m_i g_{i,1} \tag{60}$$

$$y_{i,2}^s = m_i g_{i,2} \tag{61}$$

$$g_{i,1} = d_i \tag{62}$$

$$g_{i,2} = -(1 + i_i^l)d_i \tag{63}$$

Solving this problem, in equilibrium, we obtain[5]:

$$d_i = \upsilon_{i,d}\beta\frac{\partial p(y_{i,1})}{\partial y_{i,1}}\phi_i + \upsilon_{i,d}\gamma_{i,1} - \upsilon_{i,d}\frac{\alpha}{\lambda}\pi^e_{i,1} - \upsilon_{i,d}\delta_i\overline{\gamma}_{i,2} + \upsilon_{i,d}\frac{\alpha\delta_i}{\lambda}\pi^e_{i,2}$$

where:

$$\upsilon_{i,d} = \frac{\lambda^2}{m_i\alpha\left(1+(1+i^l_i)\delta_i\right)} > 0 \qquad \text{and} \tag{64}$$

$$\delta_i = (1+i^l_i)\beta \tag{65}$$

$\upsilon_{i,d}$ consists of only exogenous parameters of the model and has always a positive sign. Moreover, given the parameters that it comprises, $\upsilon_{i,d}$ can be considered as a kind of "discount factor" in this expression.

The only endogenous parameters in the expression above of the optimal level of debt are the levels of expected inflation in the first and second period, which are determined by the optimal monetary policy.

Small Country Case In order to compare the optimal fiscal policy in the monetary union with the optimal fiscal policy in the benchmark case, we now focus on the situation of a small country in the monetary union ($i = S$) which is assumed to be the same country analyzed in the previous model. With this assumption we are able to compare what drives the opportunistic PBCs of a small country before and after adhering to the monetary union. Hence, in the expression for a small country is given by:

$$d^S = \upsilon^S_d\beta\frac{\partial p(y^S_1)}{\partial y^S_1}\phi^S + \upsilon^S_d\gamma^S_1 - \upsilon^S_d\frac{\alpha}{\lambda}\left(\pi^e_1\right)^S - \upsilon^S_d\delta^S\overline{\gamma}^S_2 + \upsilon^S_d\frac{\alpha\delta^S}{\lambda}\left(\pi^e_2\right)^S$$

where:

$$\upsilon^S_d = \frac{\lambda^2}{m^S\alpha\left(1+(1+i^{S_l})\delta^S\right)} > 0 \qquad \text{and} \tag{66}$$

$$\delta^S = (1+i^{S_l})\beta \tag{67}$$

It is assumed that the optimal of inflation of the small country is given by the optimal level of inflation of the monetary union, $\pi^S_t = \pi^U_t$, which we assume to be equivalent to the optimal level

[5] See algebra in section 2.1 of Appendix II

in the large country, i.e. $\pi_t^S = \pi_t^U = \pi_t^L$. So, with rational expectations, we have:

$$(\pi_t^e)^S = E\left[\pi_t^S\right] = E\left[\pi_t^L\right] = E\left[\frac{c\lambda}{\alpha}\gamma_t^L\right] = \frac{c\lambda}{\alpha}E\left[\gamma_t^L\right] = \frac{c\lambda}{\alpha}\overline{\gamma}_t^L \tag{68}$$

Therefore, the **optimal level of debt of the Small Country** is given by:

$$d^S = \upsilon_d^S\beta\frac{\partial p(y_1^S)}{\partial y_1^S}\phi^S + \upsilon_d^S\gamma_1^S - \upsilon_d^S c\overline{\gamma}_1^L - \upsilon_d^S\delta^S\overline{\gamma}_2^S + \upsilon_d^S\delta^S c\overline{\gamma}_2^L \tag{69}$$

Comparative Statics In order to study what affects the fiscal policy decision in a monetary union we proceed to the analysis of how the optimal level of debt responds to changes in:

i) the sensibility of the probability of reelection with respect to output:

$$\frac{\partial d^S}{\partial\left[\frac{\partial p(y_1^S)}{\partial y_1^S}\right]} = \frac{\lambda^2\beta}{m^S\alpha\left(1+(1+i^{S_l})\delta^S\right)}\phi^S > 0 \tag{70}$$

This condition is the same as in the benchmark model for the small country: the higher is the sensibility of the probability of reelection with respect to output the higher will be the level of debt. Thus, if the probability of reelection reacts more to the economic conditions, the politician will be more tempted to increase debt in order to enhance his prospects of being reelected. Moreover, this effect is stronger the more the politician's utility improves by being in office, i.e. for higher values of ϕ_i. This condition supports the existence of opportunistic budget cycles also in the monetary union model.

ii) the additional utility the politician gets for being in office:

$$\frac{\partial d^S}{\partial\phi^S} = \frac{\lambda^2\beta}{m^S\alpha\left(1+(1+i^{S_l})\delta^S\right)}\frac{\partial p(y_1^S)}{\partial y_1^S} > 0 \tag{71}$$

This condition is also the same as in the benchmark model for the small country: the higher is the extra welfare that the politician gets from being in office the higher will be the level of debt and so the political budget cycles will be more pronounced the more the politician benefits from being in office.

By the two last conditions we can conclude that the political factors influencing the fiscal policy are the same in both the benchmark and the monetary union model. Therefore, the opportunistic political budget cycles are driven by the same factors before and after the monetary union.

iii) Shock in Small Country in the First Period:

$$\frac{\partial d^S}{\partial \gamma_1^S} = \frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} > 0 \tag{72}$$

The intuition behind this condition is given by the role of the small country's shock in the first period, γ_1^S, in the politician's intertemporal utility function. Since γ_1^S represents the impact of output in the first period on the intertemporal utility function, a higher value strengthens the politician's incentives to engage in expansionary fiscal policies during the election year.

This condition is also the same as in the benchmark model, so the small country shocks in the first period have similar effects on this country fiscal policy before and after the monetary union.

iv) Mean of the Shock:

a) Small Country in the Second Period:

$$\frac{\partial d^S}{\partial \overline{\gamma}_2^S} = -\frac{\lambda^2 \delta^S}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} < 0 \tag{73}$$

Since $\overline{\gamma}_2^S$ represents the impact of the second period's expected output in the politician's intertemporal utility, a higher value implies a greater detrimental effect of a recession in the second period on the politician's intertemporal utility function and, consequently, a reduction of her incentives to raise the level of debt during an election year.

This condition is no longer the same as in the benchmark model because here it is not being affected by the degree of central bank independence. This is explained by the fact that before the monetary union the small country's expected shocks were also affecting the expected level of inflation and so being accommodated by the central bank, whereas in the monetary union the central bank is just responding to the shocks in the large country.

b) Large Country in the First Period:

$$\frac{\partial d^S}{\partial \overline{\gamma}_1^L} = -\frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} c < 0 \tag{74}$$

Since in the monetary union the central bank is only responding to the shocks of the larger member country, a higher value of $\overline{\gamma}_1^L$, for a given c, leads to a higher level of expected inflation in the first period. Although this effect is attenuated by having a more independent central bank that keeps inflation lower on average, it also implies that is optimal for the politician to contract a lower level of debt to avoid further detrimental inflationary pressures.

This condition is equivalent to the effect of small country shock in the first period before the monetary union. This is, once again, explained by the fact that in the monetary union the small country's expected shocks are no longer influencing the expected level of inflation because the

central bank is just accommodating the shocks in the large country.

c) Large Country in the Second Period:

$$\frac{\partial d^S}{\partial \overline{\gamma}_2^L} = \frac{\lambda^2 \delta^S}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} c > 0 \tag{75}$$

A higher value of $\overline{\gamma}_2^L$, for a given c, implies a higher expected inflation in the second period, reducing the politician's intertemporal utility and strengthening the politician's incentives to engage in expansionary policies in order to counterbalance this negative impact of inflation. Furthermore, in the presence of a less independent (or conservative) central bank, augmenting $\overline{\gamma}_2^L$ implies a greater increase of expected inflation in the second period, ergo fiscal policies even more expansionary to attenuate the negative impact on the politician's utility.

v) the level of conservativeness (central bank independence):

$$\frac{\partial d^S}{\partial c} = -\frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} \overline{\gamma}_1^L + \frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} \delta^S \overline{\gamma}_2^L \tag{76}$$

$$= \frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} \left(\delta^S \overline{\gamma}_2^L - \overline{\gamma}_1^L\right) \tag{77}$$

The intuition behind this condition is exactly the same as the one behind the equivalent expression in the benchmark model. Hence, the politician's decision about following expansionary or contractionary fiscal policies as a reaction to an increase in c depends on her expectations of whether inflation will be higher in the first or the second period. However, here the central bank sets monetary policy by responding only to the shocks in the large country and so the expected inflation is determined not by the mean of the shocks in the small country but by the mean of the shocks in the large country.

We study conditions iv) and v) in further detail in section 3.3.

vi) the fiscal multiplier of the Small Country:

$$\frac{\partial d^S}{\partial m^S} = -\frac{\lambda^2}{\left(m^S\right)^2 \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} \left[\beta \frac{\partial p(y_1^S)}{\partial y_1^S} \phi^S + \gamma_1^S - c\overline{\gamma}_1^L - \delta^S \overline{\gamma}_2^S + \delta^S c \overline{\gamma}_2^L\right] \tag{78}$$

$$= -\frac{1}{m} d^S \tag{79}$$

and we have that:

$$\frac{\partial d^S}{\partial m^S} < 0 \text{ iff } d > 0 \tag{80}$$

This condition is equal in the benchmark case. Hence, with a higher fiscal multiplier it will be optimal for the small country's politician to follow a not so expansionary fiscal policy, since an increase in debt implies now a stronger improvement of her intertemporal utility.

vii) the elasticity of output with respect to deviations of inflation from its expected level:

$$\frac{\partial d^S}{\partial \lambda} = \frac{2\lambda}{m^S \alpha \left(1 + (1 + i^{S_l})\delta^S\right)} \left[\beta \frac{\partial p(y_1^S)}{\partial y_1^S} \phi^S + \gamma_1^S - c\overline{\gamma}_1^L - \delta^S \overline{\gamma}_2^S + \delta^S c\overline{\gamma}_2^L\right] \tag{81}$$

In this case, the sigh of $\frac{\partial d^S}{\partial \lambda}$ is ambiguous because it depends on the interaction between the political factors and the shocks. This condition is similar to the equivalent one in the benchmark case; however, in the monetary union the shocks in the large country are also affecting the sign of this condition.

viii) the discount factor β:

$$\frac{\partial d^S}{\partial \beta} = \frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l})^2 \beta\right)^2} \left[\frac{\partial p(y_1^S)}{\partial y_1^S} \phi^S - (1 + i^{S_l})^2 \left(\gamma_1^S - c\overline{\gamma}_1^L\right) - (1 + i^{S_l}) \left(\overline{\gamma}_2^S - c\overline{\gamma}_2^L\right)\right]$$

Once again, the sigh of $\frac{\partial d^S}{\partial \beta}$ is ambiguous because it depends on the interaction between the political factors, the shocks and the interest paid on debt. This condition is similar to the equivalent one in the benchmark case; however, in the monetary union the shocks in the large country are also affecting the sign of this condition.

ix) the long-term interest rate on debt paid by the Small Country debt of the small is given by:

$$\frac{\partial d^S}{\partial i^{S_l}} = -\frac{2(1 + i^{S_l})\lambda^2}{m^S \alpha \beta \left(1 + (1 + i^{S_l})\delta^S\right)^2} \left[\beta \frac{\partial p(y_1^S)}{\partial y_1^S} \phi^S + \gamma_1^S - c\overline{\gamma}_1^L + \left(1 - \frac{\delta^S}{2}\right) \left(\overline{\gamma}_2^S - c\overline{\gamma}_2^L\right)\right]$$

The sigh of $\frac{\partial d}{\partial i^l}$is also ambiguous, depending once again on the interaction between the political factors, the shocks, the expected shocks accommodated by the central bank and the discount factor δ^S. This condition is also similar to the equivalent one in the benchmark case; however, in the monetary union the shocks in the large country are also affecting the sign of this condition.

3.3 Comparing the results: Benchmark Model vs. Model of the Monetary Union

The analysis of the comparative statics allows us to understand the main effects determining the politician's optimal fiscal policy during an election year and also to compare these effects at a country level before and after joining the monetary union. By comparing these conditions in both models we notice that the main difference between the two relies on the effects of the shocks in the second period and on the effect of the central bank's level of independence. Hence, in this section we study in further detail these two effects on the politician's optimal fiscal policy through a graphical analysis and comparing before and after the monetary union. We first study the relationship between the degree of central bank independence and the optimal level of debt, and then the influence of the mean of the shocks in the second period on this relationship. Lastly, we proceed to analyze the relationship between the mean of the shocks in the second period and the optimal level of debt, and then the influence of the degree of central bank independence on this relationship.

3.3.1 Debt and Central Bank Independence

Here we analyze graphically the relationship between the degree of central bank independence and the optimal level of debt, and then we compare the situation before and after the monetary union.

Benchmark Model We study first the case of the benchmark model where the level of debt is given by:

$$d = \upsilon_d \left[\beta \frac{\partial p(y_1)}{\partial y_1} \phi - (\delta \overline{\gamma}_2 - \gamma_1) \right] + \upsilon_d \left(\delta \overline{\gamma}_2 - \overline{\gamma}_1 \right) c \tag{82}$$

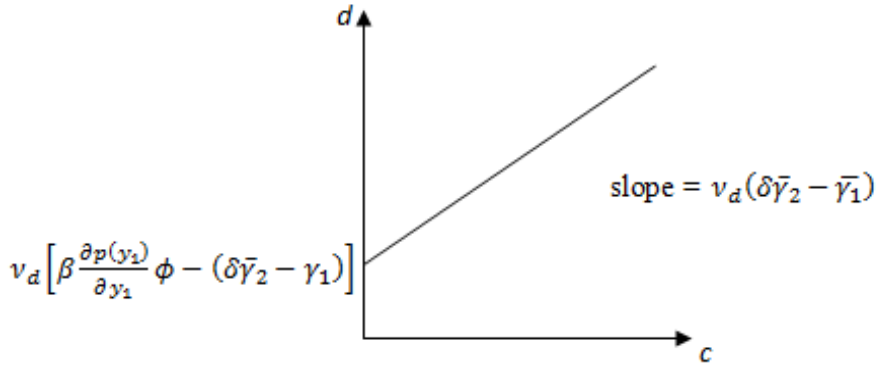
where:

$$\upsilon_d = \frac{\lambda^2}{m\alpha \left(1 + (1 + i^l)\delta\right)} > 0 \qquad \text{and} \tag{83}$$

$$\delta = (1 + i^l)\beta \tag{84}$$

Plugging this expression in a (c, d) space we have[6]:

[6] In this case, to simplify the analysis, it is assumed that $\delta \overline{\gamma}_2 > \overline{\gamma}_1$ so that the slope is positive and that $\delta \overline{\gamma}_2 < \beta \frac{\partial p(y_1)}{\partial y_1} \phi + \gamma_1$ so that the intercept is also positive. That is, it is assumed: $\overline{\gamma}_1 < \delta \overline{\gamma}_2 < \beta \frac{\partial p(y_1)}{\partial y_1} \phi + \gamma_1$.



Graph 3.1

The graph above shows how the degree of central bank independence (or conservativeness) influences the optimal level of debt contracted by the incumbent politician during the election year. We observe that whether this influence is positive or negative depends on the mean of the shocks in the first and second period. The intuition behind this result is given by the detrimental impact of expected inflation on the politician's intertemporal utility and her optimal decision to offset it.

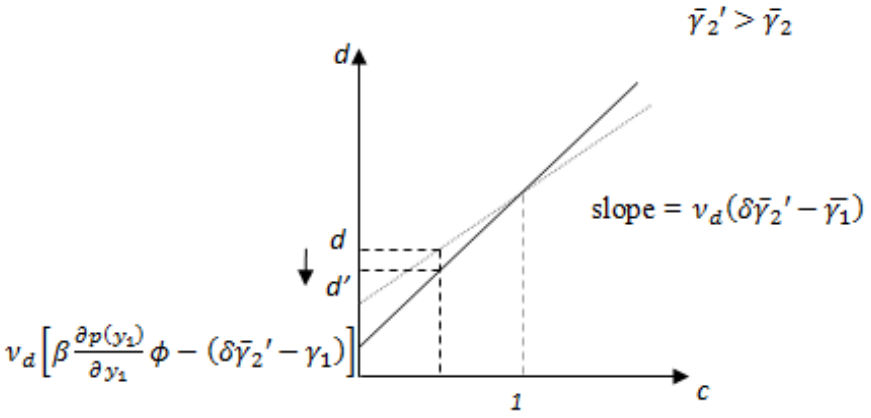
A lower level of central bank independence (or conservativeness) - i.e. higher c - represents higher levels of inflation in both periods. Thus, the politician's decision about following expansionary or contractionary fiscal policies depends on her expectations of whether inflation will be higher in the first or the second period. If the politician expects higher inflation in the first period

then she will contract a lower level of debt in order to avoid any further inflationary pressures, while if the expectation of inflation is higher in the second period she will engage in expansionary policies to counterbalance the negative impact of inflation on her intertemporal utility. Also, these expectations about the level of inflation are based on the expectations about the shocks in both periods and so two scenarios can occur. Firstly, we can have the case when the politician expects the present value of the mean of the shock in the second period[7] to be higher than the mean of the shock in the first period, i.e. $\delta\overline{\gamma}_2 > \overline{\gamma}_1$. In this case, if we have an increase in the value of c, inflation in the second period is expected to be higher than inflation in the first period and, therefore, it will be optimal for the politician to contract a higher level of debt to counterbalance the negative impact of inflation on her intertemporal utility. Secondly, we can have the case that the politician expects $\overline{\gamma}_1 > \delta\overline{\gamma}_2$ and if c increases we have $\pi_1^e > \delta\pi_2^e$. Then, in this case, it will be optimal for the politician to choose a lower level of debt in order to avoid more inflationary

[7] In other words, the expected value at the year of election of the shock in the year after the election.

pressures in the first period. For conciseness, we analyze graphically only the first scenario, which is illustrated by graph 3.1.

The analysis above highlights the importance of the mean of the shocks on how the degree of central bank independence influences the optimal fiscal policy. Hence, it is interesting to analyze how this influence changes given a shift in the mean of the shock in the second period. Graphically, we notice that if $\overline{\gamma}_2$ increases the curve becomes steeper and moves downwards. Graph 3.2 illustrates this change:



Graph 3.2

This graph shows that in the case where the politician expects $\delta\overline{\gamma}_2 > \overline{\gamma}_1$, if the mean of the shock in the second period experiments an increase from $\overline{\gamma}_2$ to $\overline{\gamma}_2'$, then it will be optimal for the politician to contract a lower level of debt. An increase in the value of $\overline{\gamma}_2$ affects negatively the politician's intertemporal utility via the impact of a recession and via a higher expected inflation, both in the second period. Thus, whether it is optimal for the politician to engage in contractionary of expansionary fiscal policies as a response to an increase in $\overline{\gamma}_2$ depends on which of these two effects is stronger. In other words, a higher value of $\overline{\gamma}_2$ implies that a recession in the second period caused by an expansionary fiscal policy in the year of election will be more detrimental to politician's utility and so it will be optimal for her to choose a lower level of debt. On the other hand, if $\overline{\gamma}_2$ is higher, expected inflation in the second period will also be higher, for a given c, strengthening the politician's incentives to contract a higher level of debt to attenuate the negative effect of π_2^e on the her intertemporal utility. However, this negative effect of expected inflation is reduced by having a more conservative (or independent) central bank and, consequently, the impact of a recession in the second period is stronger. This fact is illustrated in graph 3.2 where for values of c between zero and one it is optimal for the politician to contract a lower level of debt as a response to an increase in $\overline{\gamma}_2$.

Monetary Union We now extend the analysis to the Monetary Union case, where the central bank sets monetary policy only taking into account the situation of the large country and the optimal level of debt for the incumbent politician in the small country is given by:

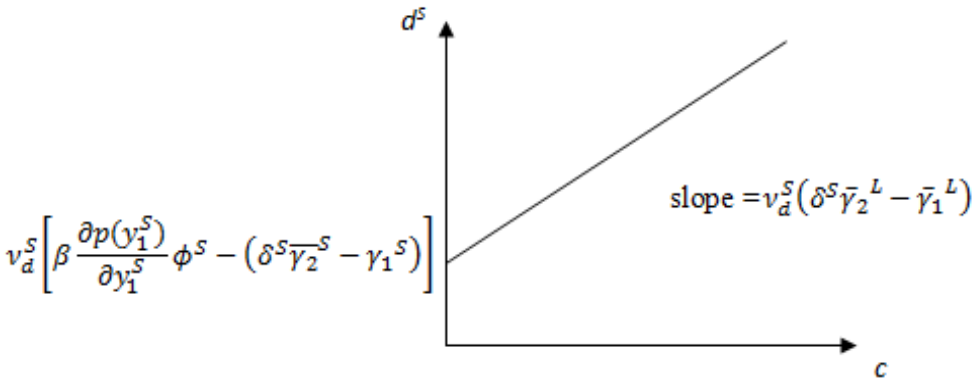
$$d^S = v_d^S \left[\beta \frac{\partial p(y_1^S)}{\partial y_1^S} \phi^S - \left(\delta^S \overline{\gamma}_2^S - \gamma_1^S \right) \right] + v_d^S \left(\delta^S \overline{\gamma}_2^L - \overline{\gamma}_1^L \right) c$$

where:

$$v_d^S = \frac{\lambda^2}{m^S \alpha \left(1 + (1 + i^{S_l}) \delta^S\right)} > 0 \qquad \text{and} \tag{85}$$

$$\delta^S = (1 + i^{S_l}) \beta \tag{86}$$

Thus, plotting this expression in a (c, d^S) space we have[8]:



Graph 3.3

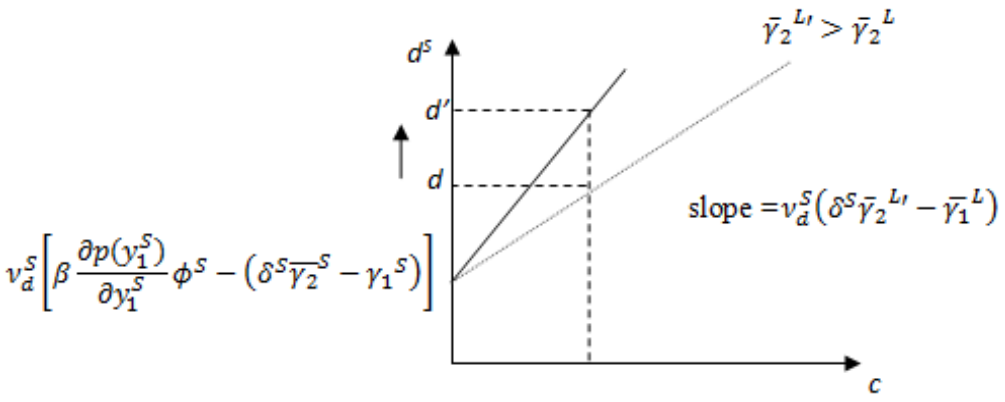
The graph above shows how the degree of central bank independence (or conservativeness) influences the optimal level of debt contracted by the small country's incumbent politician during the election year. The intuition behind this result is exactly the same as the one behind the equivalent one in the benchmark model. Hence, whether the politician engages in expansionary or contractionary fiscal policies as a response to an increase in c depends on her expectations about inflation and we have the two possible scenarios as before. However, here the central bank is responding only to the shocks in the large country and so the expected inflation is determined not by the mean of the shocks in the small country but by the mean of the shocks in the large country.

Once again, for this graphical analysis we only focus on the case where the politician expects the present value of the mean of the large country shock in the second period to be higher than the

[8] In this case it is assumed that $\delta^S \overline{\gamma}_2^U > \overline{\gamma}_1^U$ so that the slope is positive and that $\delta^S \overline{\gamma}_2^S < \beta \frac{\partial p(y_1^S)}{\partial y_1^S} \phi^S + \gamma_1^S$ so that the intercept is also positive.

mean of the large country shock in the first period, i.e. $\delta^S \overline{\gamma}_2^L > \overline{\gamma}_1^L$. Then, increasing in the value of c implies that expected inflation in the second period is higher than inflation in the first period. Hence, it will be optimal for the politician to contract a higher level of debt to counterbalance the negative impact of inflation on her intertemporal utility - explaining the positive sign of the curve's slope in graph 3.3.

As before, it is also important to analyze how a change in the mean of the large country shock in the second period affects this result. Graphically, we notice that a increase in value of $\overline{\gamma}_2^L$ only influences the value of the slope turning the curve steeper. Graph 3.4 illustrates this change:



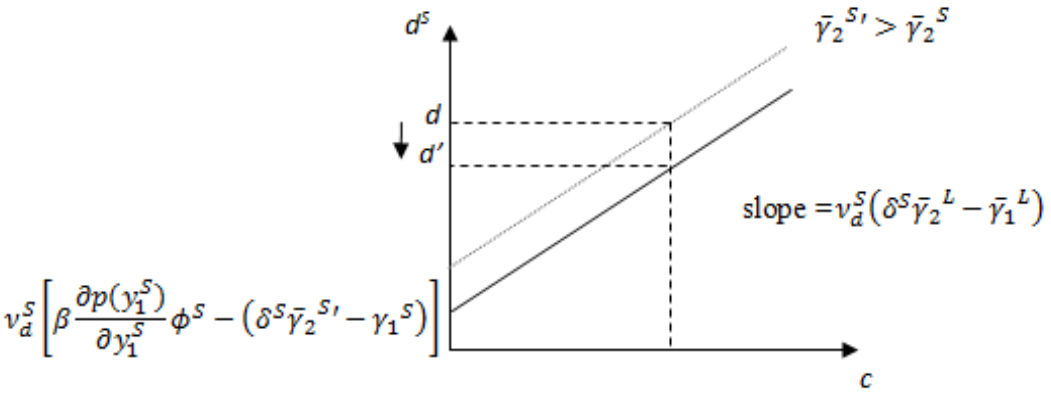
Graph 3.4

We know that if $\overline{\gamma}_2^L$ is higher, expected inflation in the second period will also be higher, for a given c, reducing the politician's intertemporal utility. However, a higher level of debt represents a decrease in the expected output of the second period, attenuating the inflationary pressures. Thus, a decrease in the mean of this shock from $\overline{\gamma}_2^L$ to $\overline{\gamma}_2^{L\prime}$ strengthens the politician's incentives to engage in expansionary policies in order to counterbalance the negative impact of inflation on her intertemporal utility - represented graphically by the rise of d to d'. Also, in the graph we observe that this effect is smaller for lower levels of c, which can be explained by the fact that with a more independent central bank inflation is kept lower on average, reducing the politician's incentives of compensating it with a more expansionary fiscal policy during the election year.

Contrarily to the benchmark case, graph 3.4 illustrates that in the monetary union an increase of $\overline{\gamma}_2^L$ always results in an increase in the optimal level debt for the small country's politician, independently from the degree of central independence (or conservativeness). The intuition for this result is given by the fact that the mean of this shock here is only affecting the politician's intertemporal utility via expected inflation in the second period and so it is always optimal for the politician to counterbalance this effect by contracting a higher level of debt in the election year

without being concerned with the implications of a recession next period.

Furthermore, it is also important to analyze how in the monetary union the shocks in the small country affect the influence of the degree of central bank independence (or conservativeness) on the small country's optimal fiscal policy and so we proceed to the graphical analysis of a change in the mean of the small country shock in the second period. In graph 3.3 we observe that an increase in the value of $\overline{\gamma}_2^S$ decreases the value of intercept moving the curve downwards. Graph 3.5 illustrates this change:



Graph 3.5

In this graph, we observe that a higher mean of the small country shock in the second period implies a reduction of the optimal level of debt, independently from the degree of central bank independence. The intuition behind this result is given by the role of $\overline{\gamma}_2^S$ in the politician's intertemporal utility function. In the monetary union, $\overline{\gamma}_2^S$ simply represents the impact of the second period's expected output in the politician's intertemporal utility. Since in the year after the election the politician must pay all the debt contracted in the previous period, a more expansionary fiscal policy results in a lower level of output next period. Thus, if we have an increase from $\overline{\gamma}_2^S$ to $\overline{\gamma}_2^{S\prime}$ the greater will be the negative impact of a recession in the second period on the small country politician's intertemporal utility function and so it will be optimal for the politician to choose a lower level of debt - represented in the graph by the reduction from the d to d'.

Contrarily to the benchmark case, the negative impact of an increase in the mean of the shock in the second period on the politician's intertemporal utility is not attenuated by having a more independent (or conservative) central bank. In the monetary union, the mean of the small country's shocks does not influence the expected inflation because the central bank is only responding to shocks in the large country. Therefore, a higher value of $\overline{\gamma}_2^S$ does not augment the expected inflation in the second period and so the small country's politician does not need to counterbalance the negative impact on her utility by engaging in expansionary fiscal policies.

4 Debt and Shocks

The previous analysis highlights the importance of the mean of the shocks, particularly in the second period, in explaining the optimal level of debt for the politician during an election year. Hence, we extend the graphical analysis to the influence of the shocks' mean in the second period on the optimal fiscal policy.

Benchmark Model We study first the case of the benchmark model where the level of debt is given by:

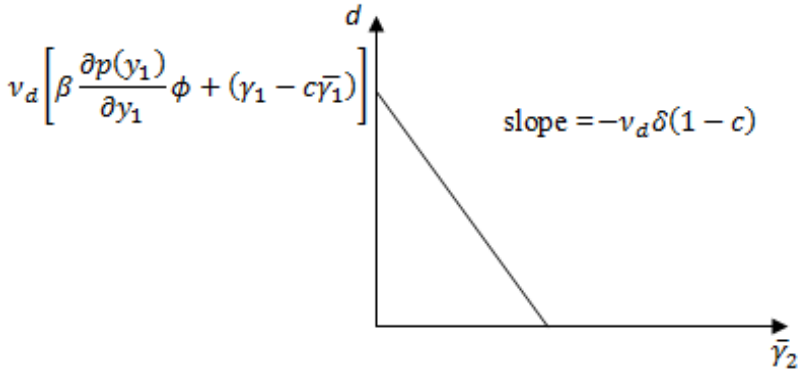
$$d = \upsilon_d \beta \frac{\partial p(y_1)}{\partial y_1} \phi + \upsilon_d \left(\gamma_1 - c\overline{\gamma}_1\right) - \upsilon_d \delta \left(1 - c\right) \overline{\gamma}_2 \tag{87}$$

where:

$$\upsilon_d = \frac{\lambda^2}{m\alpha \left(1 + (1 + i^l)\delta\right)} > 0 \qquad \text{and} \tag{88}$$

$$\delta = (1 + i^l)\beta \tag{89}$$

Plugging this expression in a $(\overline{\gamma}_2, d)$ space we have[9]:



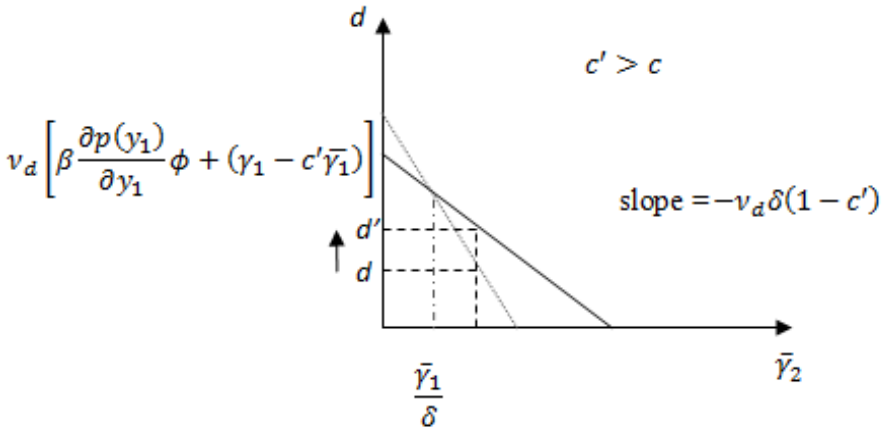
Graph 3.6

Graph 3.6 illustrates that for higher values of the mean of the shock in the second period it is optimal for the politician to contract a lower level of debt. However, this effect is attenuated by having a less independent (or conservative) central bank. The intuition behind this condition is given by the role of $\overline{\gamma}_2$ on the politician's intertemporal utility. As was previously explained, $\overline{\gamma}_2$

[9] In this case the slope is negative since it was previously assumed that $0 < c < 1$. Moreover, the intercept is positive if we assume $\gamma_1 > c\overline{\gamma}_1 - \beta\frac{\partial p(y_1)}{\partial y_1}\phi$.

affects negatively the politician's intertemporal utility via two different channels - the impact of a recession and higher expected inflation, both in the second period - whether it is optimal for the politician to engage in contractionary of expansionary fiscal policies as a response to an increase in $\overline{\gamma}_2$ depends on which of these two effects is stronger. Since the negative impact of expected inflation can be reduced by having a more conservative (or independent) central bank, the impact of a recession in the second period is necessarily stronger, explaining the negative slope of this curve.

As we observe degree of central bank independence plays a crucial role in this relationship, highlighting the importance of also studying of the impact of changes in c. In graph 3.6, we notice that an increase in c moves the curve downwards and turns it flatter. Graph 3.7 illustrates this change:



Graph 3.7

In graph 3.7 we notice that the effect of this change on the optimal level of debt depends on the relationship between the mean of the shocks in the first and second period, i.e. we observe in the graph that given an increase in c, the optimal level of debt decreases or increases depending if $\overline{\gamma}_2$ is greater or not than $\frac{\overline{\gamma}_1}{\delta}$. The intuition for this result is given by the influence of inflation on the politician's intertemporal utility. A lower level of central bank independence (or conservativeness), a higher c, represents higher levels of inflation in both periods. Thus, the politician's decision about following expansionary or contractionary fiscal policies depends on her expectations of whether inflation will be higher in the first or the second period. Since these expectations about the level of inflation are based on the expectations about the shocks in both periods, we have once again the two possible scenarios explored previously. On the one hand, we can have the case when the politician expects the present value of the mean of the shock in the second period to be higher than the mean of the shock in the first period - represented in the graph by the points where

$\overline{\gamma}_2 > \frac{\overline{\gamma}_1}{\delta}$. In this case, if we have an increase in the value of c, inflation in the second period is expected to be higher than inflation in the first period and, therefore, it will be optimal for the politician to contract a higher level of debt to counterbalance the negative impact of inflation on her intertemporal utility. On the other hand, we can also have the case that the politician expects $\overline{\gamma}_1 > \delta\overline{\gamma}_2$ and if c increases we have $\pi_1^e > \delta\pi_2^e$. In this second case, it will be optimal for the politician to choose a lower level of debt in order to avoid more inflationary pressures in the first period. For conciseness, we analyze graphically only the first scenario, which is illustrated in graph 3.7 by an increase of the optimal level of debt from d to d'.

Monetary Union In this next part, we extend this graphical analysis to the Monetary Union. However, here we have two distinct shocks affecting the optimal fiscal policy: the shocks of the small country and the shocks of the large country, which we analyze separately.

Firstly, we analyze the influence of the mean of small country shock in the second period, $\overline{\gamma}_2^S$, on the optimal level of debt. In this case, the optimal level of debt chosen by the small country's politician in the election year is given by the following expression:

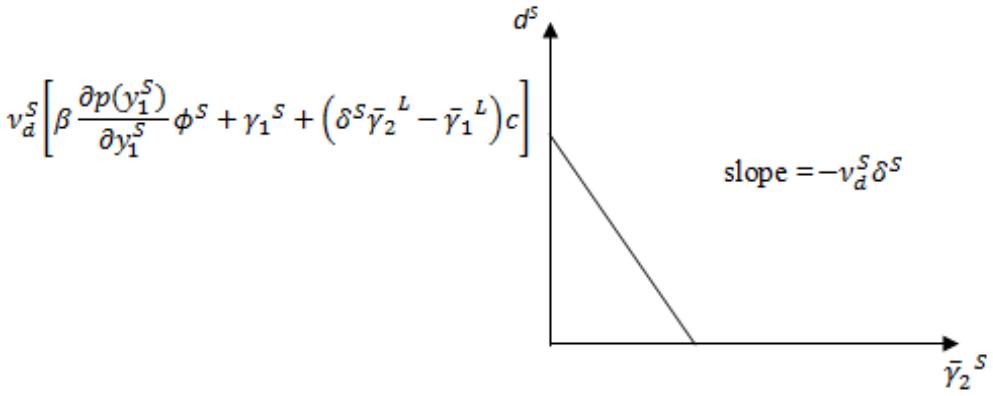
$$d^S = \upsilon_d^S \left[\beta \frac{\partial p(y_1^S)}{\partial y_1^S}\phi^S + \gamma_1^S + c\left(\delta^S \overline{\gamma}_2^L - \overline{\gamma}_1^L\right)\right] - \upsilon_d^S \delta^S \overline{\gamma}_2^S$$

where:

$$\upsilon_d^S = \frac{\lambda^2}{m^S \alpha\left(1 + (1 + i^{S_l})\delta^S\right)} > 0 \quad \text{and} \tag{90}$$

$$\delta^S = (1 + i^{S_l})\beta \tag{91}$$

Thus, plotting this expression in a $(\overline{\gamma}_2^S, d^S)$ space we have:

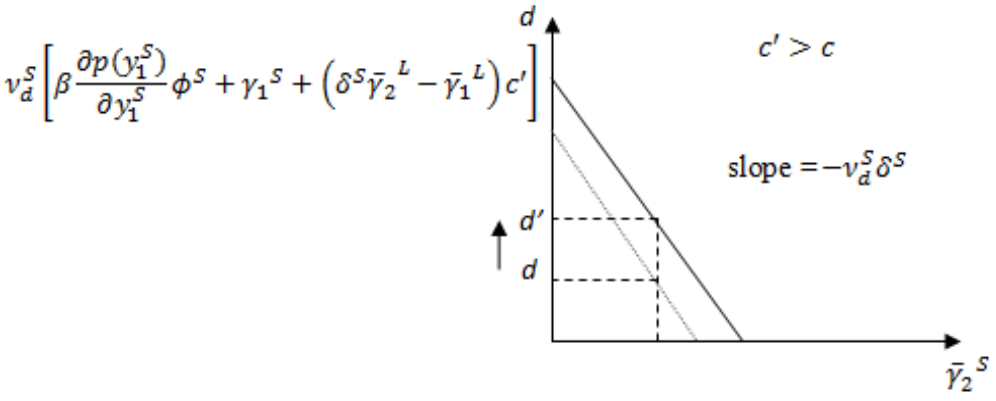


Graph 3.8

Graph 3.8 shows that for higher values of the mean of the shock in the second period it is optimal for the small country's politician to contract a lower level of debt[10]. The intuition behind this condition is given by the role of $\overline{\gamma}_2^S$ in the small country politician's intertemporal utility function. As was previously explained, since $\overline{\gamma}_2^S$ represents the impact of the second period expected output in the small country politician's intertemporal utility, a higher value implies a greater detrimental effect of a recession in the second period on the politician's intertemporal utility function and, consequently, a reduction of her incentives to raise the level of debt during an election year.

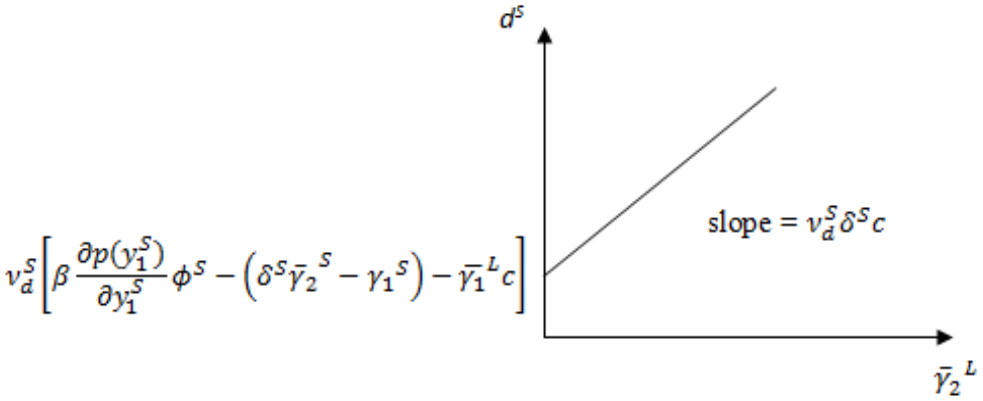
This result is different from the equivalent one in the benchmark model, with the main difference being the fact that this negative effect of the shock's mean on the optimal level of debt is not attenuated by having a less independent (or conservative) central bank. Hence, it is interesting to analyze the implications in this case of change in the value of c. From graph 3.8 we notice that an increase in c only affects the value of the intercept, however, whether the curves moves upwards or downwards depends on the expectations about the shocks in the large country. This is explained by the fact that, here, the central bank is just accommodating the shocks in the large country and so the expected inflation is determined not by the mean of the shocks in the small country but by the mean of the shocks in the large country. Thus, similarly to the benchmark case, two situations are possible. On one hand, the small country's politician expects the present value of the mean of the large country shock in the second period to be higher than the mean of the large country shock in the first period, i.e. $\delta^S\overline{\gamma}_2^L > \overline{\gamma}_1^L$, then an increase in the value of c implies that expected inflation in the second period is higher than inflation in the first period, and so a expansionary fiscal policy is optimal to counterbalance the negative impact of inflation. On the other hand, if c increases and the politician expects $\overline{\gamma}_1^L > \delta^S\overline{\gamma}_2^L$, then it will be optimal to choose a lower level of debt in order to avoid more inflationary pressures in the first period. For conciseness, we present in graph 3.9 only the representation of the first case with $\delta^S\overline{\gamma}_2^L > \overline{\gamma}_1^L$, in which an increase of c to c' implies an increase of the optimal level of debt from d to d':

[10] The slope is positive and assuming that $\overline{\gamma}_1^U < \frac{\beta}{c}\frac{\partial p(y_1^S)}{\partial y_1^S}\phi^S + \frac{\gamma_1^S}{c} + \delta^S\overline{\gamma}_2^U$ the intercept is also positive.



Graph 3.9

Finally, we analyze the influence of the mean of large country shock in the second period, $\overline{\gamma}_2^L$, on the small country's optimal level of debt. Hence, if we plot the expression of the small country's optimal fiscal policy in a monetary union into a $(\overline{\gamma}_2^L, d^S)$ space, we obtain:

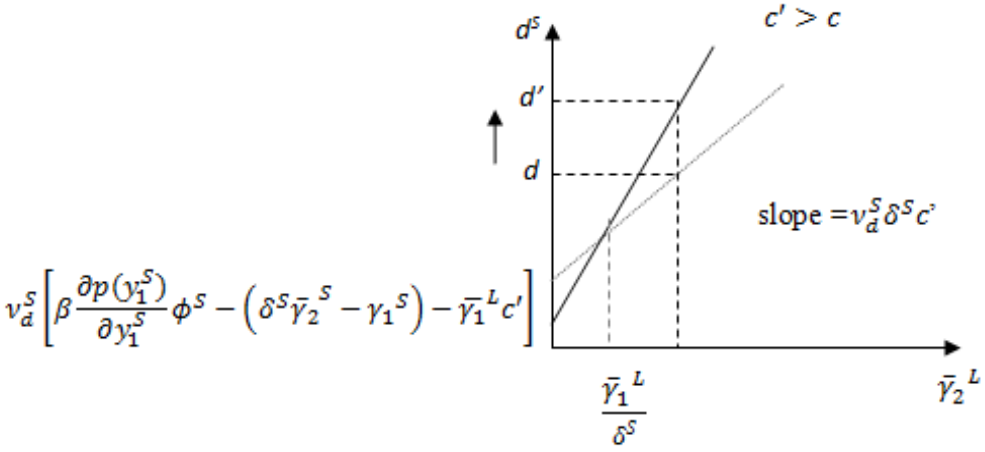


Graph 3.10

In graph 3.10 we observe that for higher values of the mean of the large country shock in the second period it is optimal for the small country's political to contract a lower level of debt. This result is explained by the fact that a higher value of $\overline{\gamma}_2^L$, for a given c, implies a higher expected inflation in the second period, reducing the politician's intertemporal utility and strengthening the politician's incentives to engage in expansionary policies in order to counterbalance this negative impact of inflation. In this case, and contrarily to the previous one, the degree of central bank independence (or conservativeness) plays an important role in this result since in the presence of less independent (or conservative) central bank, augmenting $\overline{\gamma}_2^L$ implies a greater increase of expected inflation in the second period and so fiscal policies even more expansionary to attenuate

the negative impact on the politician's utility - an effect that is represented graphically by turning the slope of the curve steeper.

Given this important role of the central bank's level of independence on this result it is interesting to study also here the implications of change in the value of c. In graph 3.10 we observe that an increase in c only affects both the value of the intercept and the slope, but what this implies on the optimal fiscal policy depends once again on the politician's expectations about inflation in the first or the second period. Thus, we have the exact same two scenarios as in the previous case regarding the politician's expectations about the shocks. We analyze graphically only the first one where the politician expects $\delta^S \bar{\gamma}_2^L > \bar{\gamma}_1^L$. In this case, we know that an increase in the value of c implies that expected inflation in the second period is higher than inflation in the first period and so it is optimal for the politician to engage in a expansionary fiscal policy to counterbalance the negative impact of inflation on her intertemporal utility - graph 3.11 illustrates this effect by the increase of the optimal level of debt from d to d' caused by a decrease in the degree of central bank independence from c to c'.



Graph 3.11

In summary, the political factors influencing the fiscal policy are the same in both the benchmark and the monetary union model. Hence, we can conclude that the opportunistic political budget cycles are driven by the same forces before and after the monetary union. Moreover, comparing the results in both models we notice that the main difference between the two relies on the influence of the shocks and the central bank's level of independence on the politician's optimal fiscal policy during an election year. On the one hand, we ascertain that the politician's decision about following expansionary or contractionary fiscal policies as a reaction to a decrease in the central bank's level of independence depends on her expectations of whether inflation will be higher in the first or the second period. If the politician expects higher inflation in the first period

then she will contract a lower level of debt in order to avoid any further inflationary pressures, while if the expectation of inflation is higher in the second period she will engage in expansionary policies to counterbalance the negative impact of inflation on her intertemporal utility. Also, these expectations about the level of inflation are based on the expectations about the shocks in both periods. Hence, in the monetary union the central bank sets monetary policy by responding only to the shocks in the large country and so the expected inflation is determined not by the mean of the shocks in the small country but by the mean of the shocks in the large country.

On the other hand, the influence of the expected shocks in the second period is considerably different before and after the monetary union because in the latter case both the shocks of the small and large country are affecting the optimal level of debt. Firstly, in the benchmark case, before the monetary union, an increase in the mean of the small country shock in the second period implies a loss in the politician's intertemporal utility function both through the impact of y_2 and π_2^e. Whether the politician attenuates this loss engaging in contractionary or expansionary fiscal policies depends on which of these two effects is stronger. The effect via expected inflation is attenuated by having a more conservative (or independent) central bank that keeps inflation lower on average. Thus, the impact of a recession in the second period is necessarily stronger and so it is optimal for the politician to contract a lower level of debt as a response to an increase in $\overline{\gamma}_2$. Finally, in the monetary union case, the mean of the small country shock in the second period, $\overline{\gamma}_2^S$, represents the impact of the expected output in this period on the politician's intertemporal utility. So, a higher value implies a greater detrimental effect of a recession in the second period and, consequently, a reduction of her incentives to raise the level of debt during an election year. Whereas a higher value of the mean of the large country shock in the second period, , $\overline{\gamma}_2^L$, for a given c, implies a higher expected inflation in the second period, reducing the politician's intertemporal utility and strengthening the politician's incentives to engage in expansionary policies in order to counterbalance this negative impact of inflation. Furthermore, in the presence of less independent (or conservative) central bank, augmenting $\overline{\gamma}_2^L$ implies a greater increase of expected inflation in the second period and so fiscal policies even more expansionary to attenuate the negative impact on the politician's utility.

5 Data and Empirical Results

In this section we study empirically the effects of elections on fiscal policy in order to support the main findings of our theoretical model presented in the previous section. An important feature of the model is influence of central bank independence (CBI) on these political budget cycles. Hence,

we focus our empirical study on the member countries of the Economic and Monetary Union in Europe (EMU) so that we can capture the effect of this important shift in the monetary policy on these countries' fiscal policy. Therefore, we consider the first twelve countries to join the EMU over the period 1980 to 2012: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

In the PBCs literature, the influence of CBI on opportunistic political budget cycles was not yet properly explored, both theoretical or empirically. There are some empirical studies that support the existence of opportunistic PBCs in the European Union and EMU. However, these studies are based on the early years of the EMU, which is not sufficient to draw definite conclusions about the effects of the change in monetary policy on the budget balances. In this study the estimation period is extended until 2012 allowing a more reasonable comparison of the fiscal outcomes before and after the entry in the EMU.

In order to study the effects of elections on fiscal policy we use general government budget balances as the dependent variable in this analysis. There is a wide variety of measures available to use as a fiscal policy indicator, namely deficits and debts, both nominal and cyclically adjusted. The debt ratio is commonly used as a broader measure of government activities than the deficit. However, as Tujula and Wolswijk (2004) argue, government annual budgetary targets are usually defined in flow terms (deficits) rather that in stock terms (debt), mainly due to the fact that stock variables are more affected by factors outside direct control of the government than flow variables and, therefore, are harder to target. There are also some studies that concentrate on government budget balances excluding interest payments because these payments are not controlled by the government and so it allows distinguishing between the automatic effects of interest rate changes on budgets and the fiscal policy reaction to that. However, taking into account these interest payments can be also relevant from a PBC perspective because if these payments rise the politician can always cut in other expenditures or be reluctant to do so in an election year (Mink and de Haan, 2006). Moreover, it is sometimes used cyclically adjusted data since it may reduce the simultaneity bias that could arise with the interaction of budgets and economic growth and, thus, correcting deficits for the effects of the business cycles may give a better of the policy related part of the budget. However, there is no consensus on how the cyclically adjusted budget balance should be computed and there are often large differences on the data provided by various international organizations. Finally, there is also the question of central versus general government data. Some studies argue that central government is the main responsible for fiscal changes. On the other hand, general government has a wider coverage and is most relevant concept in the context of the European Union fiscal policy framework.

Therefore, taking in to account all these considerations we report only in this study the main findings using nominal general government budget balance as the dependent variable. However, the same analysis was also done using general government primary budget balance and debt growth rate as dependent variables. The main results obtained are in essence very similar to the ones focused on budget balance and are presented in sections 1 and 2 of appendix IV. The data set for these variables was obtained from the European Commission Ameco and the complete variable description is presented in appendix III.

The theoretical model suggested that the optimal fiscal policy depends on the fact that there is an election that year, on the extra welfare that the politician gets from being in office, on the central bank level of independence and on shocks. Therefore, to capture these effects we consider as explanatory variables: (1) an electoral dummy, denoted *Election*, which takes the value 1 in election years and zero otherwise; (2) a corruption index, denoted *Corruption,* as a proxy for the extra welfare that the politician earns for being in office, so that for a more corrupt country this extra welfare is considered to be higher; (3) an index of central bank independence, denoted *CBI*; and, finally, to measure the fiscal responsiveness to macroeconomic conditions we use (4) the output gap as a proxy for the business cycle. Anti-cyclical policies are commonly followed in order to stabilize the economic growth around potential and, therefore, fiscal responses to recessions or booms are generally opposite: in recessions, governments tend to pursue expansionary policies to stimulate the economy, while during an economic boom contractionary fiscal policies help dampening cyclical upswings and control the inflationary pressures. Hence, we introduce this last explanatory variable to filter these automatic stabilization effects from our fiscal policy. We use two indicators for output gap: one based on potential GDP (denoted *Output Gap*) and other based on trend GDP (denoted *Output Gaptrend*), both computed by the European Commission[11]. However, since the main results are basically the same using either one of the indicators, we only present in the main text the results with the output gap based on potential GDP and we present the results with the output gap based on trend output in section 3 of appendix IV. Furthermore, for this same purpose we also use real GDP growth instead of output gap as explanatory variable, but since the main results are practically identical we present them in section 4 of appendix IV for conciseness.

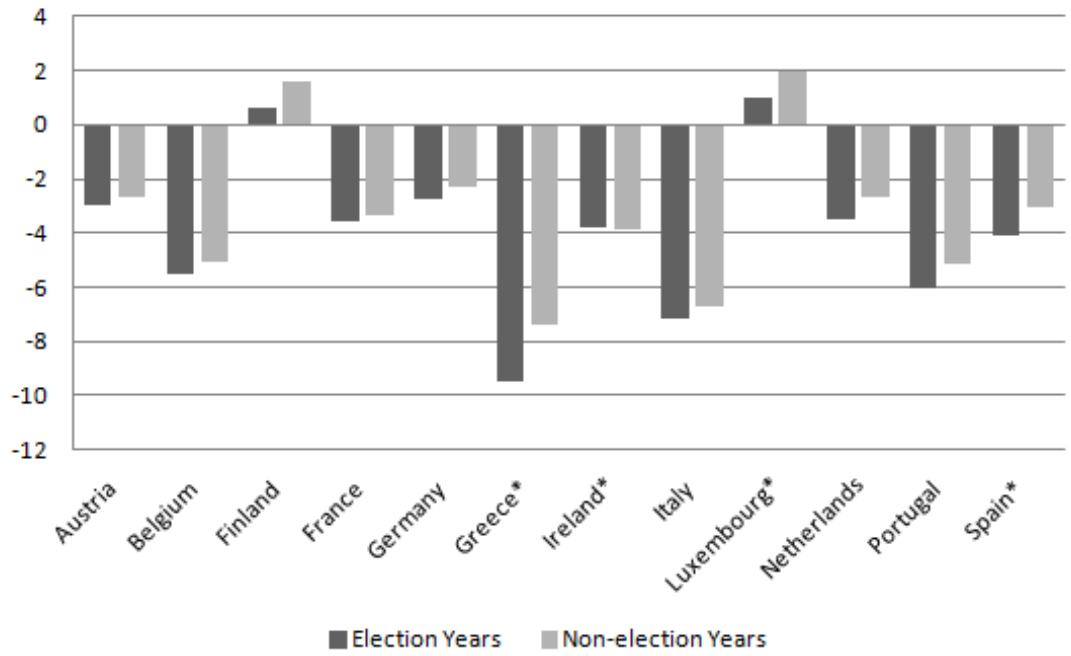
In summary, we want to find evidence that supports the existence of opportunistic political business cycles while also analyzing how central bank independence influences these cycles. Thus,

[11] According to list of variables from the European Commission Ameco (p.45) "The estimates for the output trend, the DG ECFIN cyclical adjustment method applies the Hodrick-Prescott filter to the actual output series. The Hodrick-Prescott filter minimizes the sum of squared deviations of actual output around its trend subject to a constraint on the variation of the growth rate of trend output. The filter applies weighted moving averages to the actual output series to obtain trend GDP estimates - rather than a simple arithmetic moving average - and therefore it allows for a better filtering of actual output data" (http://ec.europa.eu/economy_finance/db_indicators/ameco/documents/list_of_variables.pdf).

we study first the twelve countries over the period 1980 to 2012 and then before and after EMU in order to understand the actual influence of the central bank independence.

Firstly, to motivate this empirical analysis we show in Graph 1 some indicative evidence for the existence of PBCs in the twelve countries of the euro area. Graph 1 presents an overview of the general government budget balances as percentage of GDP during 1980-2012:

Graph 1 - Average Government Budget Balance (% of GDP): 1980-2012



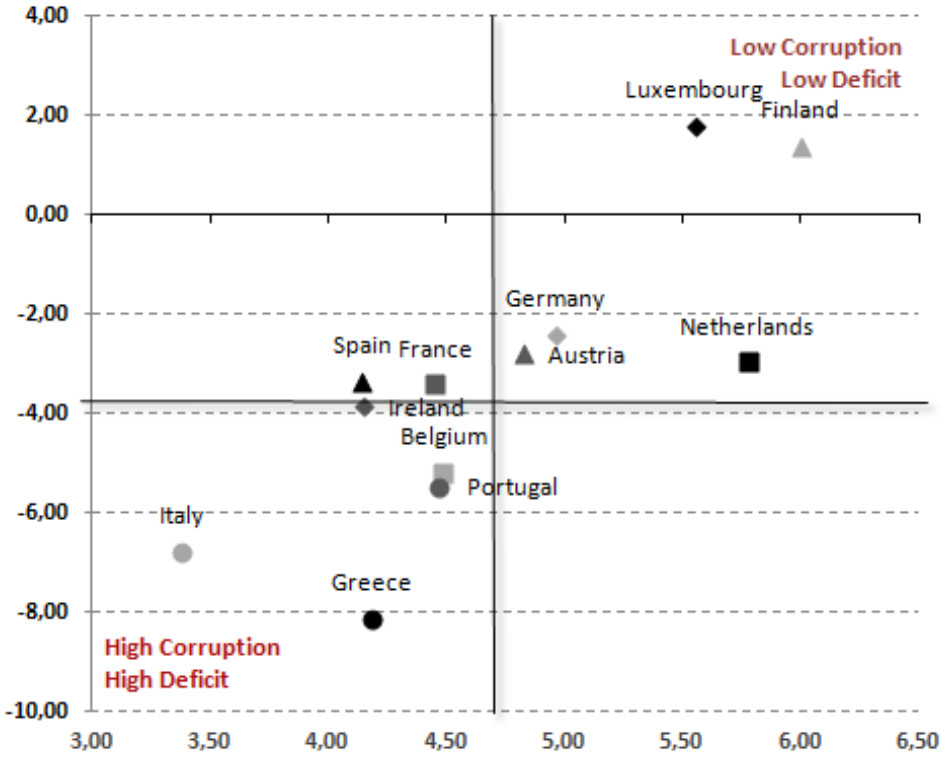
Note: * denotes that the data sample starts after 1980.

We can observe that all the 12 countries, with the exception of Ireland, have on average lower budget balances during election years than on the years without a parliamentary election. The (unweighted) average budget balance for all the election years in the sample equals -3.94%, whereas for non-election years it is -3.23%. That is, on average the budget balance is 0.71 percentage points lower during an election year which could indicate some opportunistic manipulation of fiscal policy for electoral purposes. However, in order to draw more compelling conclusions regarding the political budget cycles in the EMU, it should be constructed a model that takes into account other relevant determinants of the budget balance in line with the model hypothesis proposed in the previous section.

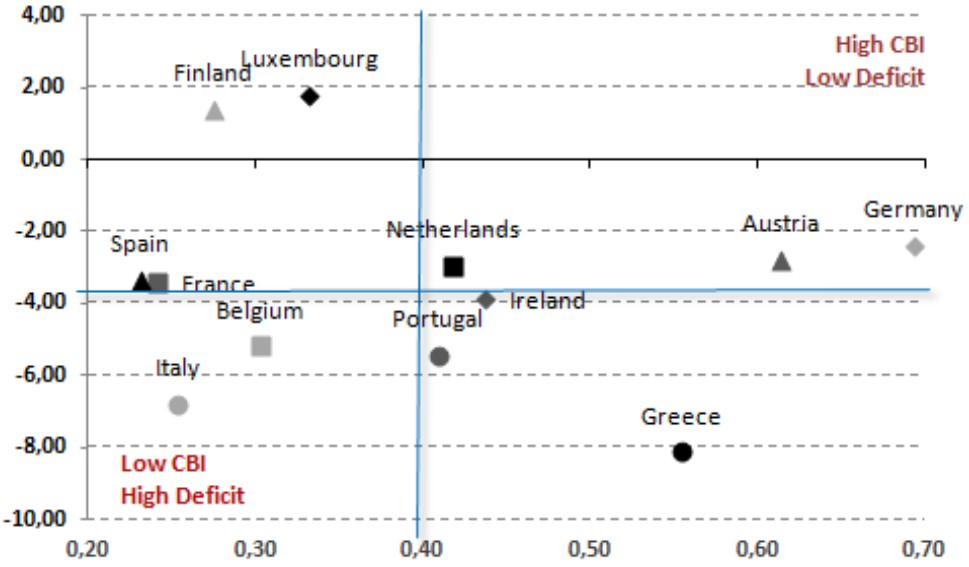
Therefore, to motivate the choice of Corruption and CBI as explanatory variables we present Graphs 2 and 3 that show the relationship between the government budget balance and corruption

and central bank independence, respectively. In graph 2 the indicator used for corruption was the corruption index of the International Country Risk Guide 1984-2006 which ranges from 0 to 6 (0 being the highest level of corruption and 6 the lowest). Thus, here a country is considered as more corrupt if the average of its corruption index is below the average of twelve countries (4.7). Moreover, a country is considered to have a high deficit if the average value of the budget balance is below the average of the twelve countries (-3.44). In this graph we can distinguish a positive trend between the index of corruption and the budget balances, i.e. the less corrupt countries present better budget balances. Moreover, it is important to notice that the majority of "high corruption" countries also present high deficits, namely Greece, Portugal, Italy, Ireland and Belgium.

Graph 2: Government Deficit and Corruption



Graph 3: Government Deficit and CBI



In Graph 3 the indicator used for central bank independence (CBI) was computed by Crowe and Meade (2007), and based on the Cukierman, Webb, and Neyapti (1992), which ranges from 0 to 1 (0 being the lowest level of CBI and 1 the highest). Thus, a country is considered as having a more independent central bank if its average CBI index is below the average of twelve countries (0.4).

In the next section we present and analyze the estimations results of the model where the estimates are based on pooled Least Squares[12]. The estimation period is 1980-2012, but shorted for some countries and for some explanatory variables reflecting the availability of the data. For comparative purposes we also estimate the model for the period before and after the creation of the Economic and Monetary Union in Europe, 1980-1998 and 1999-2012, respectively. All estimations include country- and year-dummies[13], but the coefficients are not shown in the tables. Sources and descriptions of the data used are included in appendix III

5.1 Results for Government Budget Balances

In this section we study the empirical evidence of opportunistic political business cycles in the twelve countries of the EMU using nominal general government budget balance as the fiscal policy indicator. Firstly, we present the analysis for the overall sample period from 1980 to 2012. Secondly, we compare these results with the results before and after EMU.

[12] The usual estimation method used in PBCs studies. See, for example, Alesina, Roubini and Cohen (1992) or Tujula and Wolswijk (2004). However, estimates based on Fixed and Random Effects were also computed and are in line with the ones based on pooled Least Squares (see section 5 of appendix VI).

[13] Kontopoulos and Perotti (1999) motivate the inclusion of country- and year-dummies.

5.1.1 All Years: 1980-2012

In Table 1 we present the estimation results with budget balance as dependent variable during the period of 1980-2012. In column (1) we have the results including only effects of the business cycle, that is, the output gap computed as the gap between the actual GDP and the Potential GDP (denoted by *Output Gap*). We obtain that an economic upswing improves the budget balance, i.e. lowers the budget deficit. Note that this variable is highly significant and suggests that each percentage point increase in the output gap rises the net lending relative to GDP by more than 0.4 percentage points.

Table 1 – Estimation Results: 1980-2012

Dependent Variable: Budget Balance

Equation No.	(1)	(2)	(3)	(4)	(5)
Output Gap	0.422	0.409	0.568	0.558	0.564
	(2.69)***	(2.69)***	(3.90)***	(3.78)***	(3.83)***
CBI		3.346	1.951	1.959	4.020
		(2.25)**	(0.91)	(0.92)	(2.05)**
Corruption			0.343	0.323	0.438
			(1.42)	(1.34)	(1.78)*
Election				-0.605	-0.624
				(1.94)*	(2.09)**
Euro					-5.223
					(5.20)***
Constant	1.082	-1.053	1.362	1.592	1.532
	(1.36)	(0.92)	(0.72)	(0.84)	(0.81)
Observations	358	358	254	254	254
R-squared	0.63	0.64	0.74	0.74	0.75

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

In order to test the hypothesis suggested by the model that the deficit is lower with a more independent central bank, in column (2) we add to the regression the explanatory variable *CBI*, consisting of a central bank independence index which ranges between 0 and 1 (1 being the highest level of central bank independence). We obtain that an increase in the level of central bank independence improves the budget balances, i.e. lowers the deficit, which supports the hypothesis of our model. This variable is also highly significant[14].

In the model we have that the level of government deficit depends positively on the extra welfare that the politician gains from being in office. In order to test this hypothesis empirically we use the corruption index as proxy for the politician's extra welfare. Thus, in column (3) we add the symmetric of this index (denoted by *Corruption*) as explanatory variable which ranges from -6 to 0 (-6 being the less corrupt). However, the results obtained are not satisfactory since the coefficient is not significant and its sign is not in line with the predictions of the model.

Moreover, in column (4) we introduce the political the variable of our model, the *Election* dummy, which takes the value 1 in election years and zero otherwise. With this variable we intend to test the most important hypothesis of our model which states that politicians manipulate fiscal policies during election years in order to enhance their prospects of being re-elected. We obtain that the effect of elections on budget deficits is significant both statistically and economically. That is, the estimated coefficient of *Election* implies that budget balances will be lower in election years by more than 0.6 percent of GDP.

Finally, we add the dummy *Euro* in column (5) which takes value 1 when the countries have adopted the euro as their common currency and zero otherwise. With this variable we aim to control for the effects of entering the Economic and Monetary Union in Europe. This variable is highly significant and presents a negative coefficient suggesting that after joining the EMU the budget balances of the countries have deteriorated, i.e. with euro has their common currency budget balance relative to GDP decreases by around 5 percentage points.

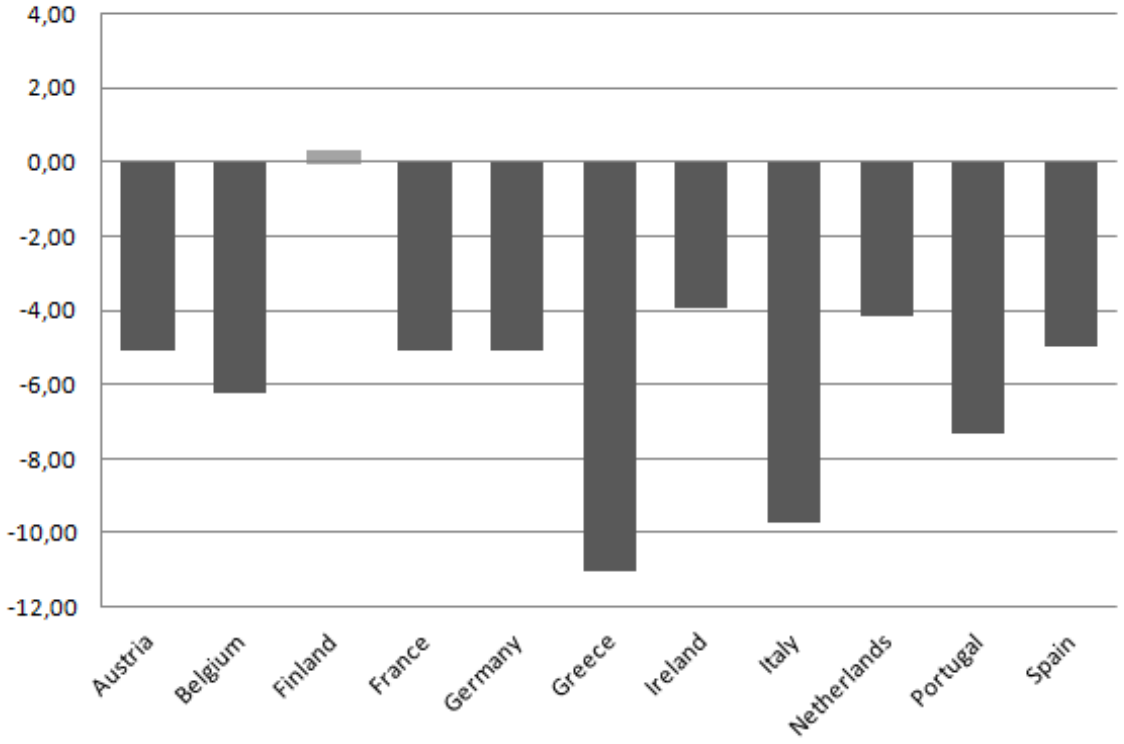
In column (5) we have the complete model and we observe that every explanatory variable is significant, even *Corruption*, while maintaining the sign of the coefficients described above. Therefore, these results not only provide relevant empirical evidence of political business cycles in the twelve countries of EMU, but also support the important hypothesis of our model which states that central bank independence also may influence these cycles.

Furthermore, other important result to analyze is the significance of the country-and year-dummies which are not reported in the table. In graphs 4 and 5 we present the coefficients of these

[14] This result suggests that one point increase in the central bank independence index improves the budget balance relative to GDP by around 3.3 percentage points.

dummies.

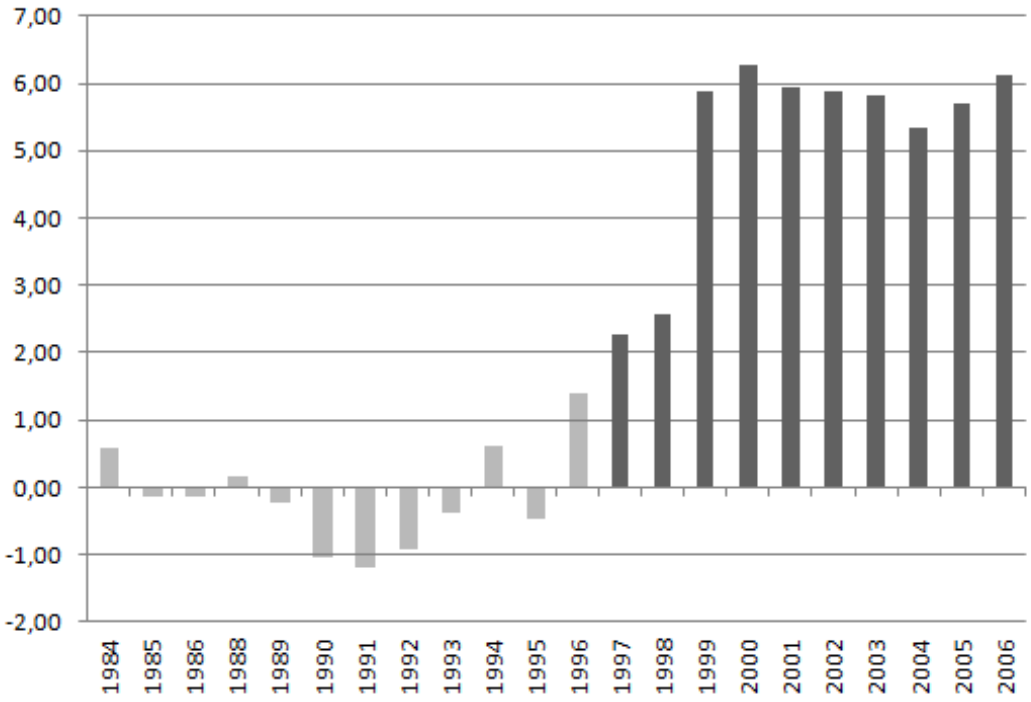
Graph 4 – Country-Dummies: Equation (5) of Table 1



Note: The darker columns represent the country-dummies with significant coefficients and the lighter columns the non-significant ones. The dummy for Luxembourg is not included due to collinearity

In graph 4 we observe that all the country-dummies have negative and significant coefficients, with the exception of Finland. Moreover, it is also relevant to notice that the countries presenting the highest coefficients in absolute value are Greece, Italy and Portugal. On the other hand, in graph 5 we have that only the year-dummies after 1997 are significant and all have positive coefficients.

Graph 5 – Year-Dummies: Equation (5) of Table 1



Note: The darker columns represent the year-dummies with significant coefficients and the lighter columns the non-significant ones. The dummy for the year 1987 is not included due to collinearity

We extended this analysis by adding two types of interaction variables. First, we introduce the interaction variables computed as the interaction between the main variables of interest and the dummy variable *Euro*: *euroElection, euroCorruption* and *EuroCBI*. With these terms we intend to control for the specific effect of the variables of interest after the creation of the EMU. However, the results obtained were not satisfactory since none of these variables presented a significant coefficient. Moreover, when any one of these variables is included in the model the dummy *Election* no longer presents a significant coefficient. A second type of interaction variables was also included in the model and they were computed as the interaction between the main variables of interest and the dummy *Election*: *ElectCorruption* and *ElectCBI*. These terms aim to control for the specific effects of the variables of interest during election years. However, the results obtained were once again not satisfactory for the exact same reasons as with the *Euro* interaction variables. Thus, the model with these groups of interaction variables does not support the existence of political budget cycles and the estimation results are presented in section 6 of appendix IV.

In order to understand the role and the importance of the inclusion of country- and year-dummies in Table 2 we present the estimation results of Table 1's equation (5) with and without country- and year-dummies.

Table 2 – Estimation Results: 1980-2012 – Comparing with and without country and year-dummies

Dependent Variable: Budget Balance

	Country- and Year-Dummies	Only Country-Dummies	Only Year-Dummies	Without Country- and Year-Dummies
Equation No.	(1)	(2)	(3)	(4)
Output Gap	0.564	0.509	0.443	0.429
	(3.83)***	(4.94)***	(2.35)**	(3.01)***
CBI	4.020	4.287	0.284	0.109
	(2.05)**	(2.28)**	(0.14)	(0.06)
Corruption	0.438	0.734	-1.717	-1.498
	(1.78)*	(2.97)***	(7.70)***	(6.42)***
Election	-0.624	-0.699	-1.109	-1.164
	(2.09)**	(2.20)**	(2.44)**	(2.54)**
Euro	-5.223	-0.061	4.077	4.246
	(5.20)***	(0.08)	(4.91)***	(4.74)***
Constant	1.532	3.547	-12.770	-11.546
	(0.81)	(1.99)**	(7.44)***	(7.98)***
Observations	254	254	254	254
R-squared	0.75	0.69	0.42	0.33

Note: Absolute value of t-statistics in parentheses. ***, ** and* denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Fiscal outcomes are influenced by macroeconomic shocks that tend to be highly correlated across countries. Hence, as argued by Kontopoulos and Perotti (1999), year-dummies can parcel out the effects of these shocks if they are only partially captured by the macroeconomic explanatory variables (*Output Gap* in this case). Moreover, political and institutional variables – as *CBI*, *Corruption* and *Election* – are generally highly correlated with unobservable and time-invariant cultural and historical country-specific characteristics. Therefore, it is extremely important to include country-dummies in order to control for the country fixed effects.

In column (1) we have the results for equation (5) as in Table 1, with country- and year-

dummies. In column (2) only the country-dummies are included and we obtain almost the same results as in column (1), with the exception of the *Euro* dummy that in this case is not significant. On the other hand, in column (3) we present the estimation results only including year-dummies and in this case they are slightly different from the results in with the also the country-dummies: no major change in the coefficient of *Output Gap*, which is still positive and significant but presenting a lower value; the coefficient of *CBI* is still positive but no longer significant; the coefficient of *Corruption* in this case is negative and highly significant – hence, in this model the level of corruption affects negatively the budget balance, i.e. a more corrupt country presents lower budget balances, which is in line with the predictions of the theoretical model; the dummy *Election* presents once again a negative and significant coefficient, but in this case much higher in absolute value; at last, the coefficient of the dummy *Euro* is still significant but positive. Finally, in column (4) we present the estimation results without both country and year dummies and in this case we obtain almost the same results as with only the year-dummies.

In summary, the model with and without country- and year-dummies always support the existence of PBCs in the twelve EMU member countries over the period 1980-2012 since the dummy *Election* always presents a negative and significant coefficient. However, how the explanatory variables affect the budget cycles depend on the inclusion of these dummies, especially the country-dummies since the most relevant differences occur when they are not inserted in the model.

5.1.2 Comparing the Estimation Results: all Years, before and after EMU

In Table 3 we compare the results obtained for the model mentioned above but for different sample periods: during 1980-2012, before joining the EMU (1980-1999) and after joining the EMU. In column (1) we present the model above, with the five explanatory variables and for the period 1980-2012.

Table 3 – Estimation Results: All years, Before EMU and After EMU

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	0.564	0.871	0.188
	(3.83)***	(5.94)***	(1.26)
CBI	4.020		
	(2.05)**		
Corruption	0.438	1.084	-0.165
	(1.78)*	(2.93)***	(0.62)
Election	-0.624	-0.374	-0.826
	(2.09)**	(1.01)	(2.71)***
Euro	-5.223		
	(5.20)***		
Constant	1.532	8.763	0.741
	(0.81)	(3.63)***	(0.49)
Observations	254	160	94
R-squared	0.75	0.77	0.88

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

The results of the model before the EMU are presented in column (2) – in this case is not necessary to include the *Euro* dummy. We obtain that the output gap still has a positive and significant impact on the budget balances, i.e. each percentage point increase in the output gap rises the net lending relative to GDP by around 0.9 percentage points. In this model the variable *CBI* is omitted due to collinearity and *Corruption* maintains a positive and significant coefficient, although higher in absolute value. An important result is the fact that the dummy *Election* is not significant here and, therefore, we do not find empirical evidence of PBCs in these twelve countries before joining the EMU.

On the other hand, we obtain that these political budget cycles are strongly present after the creation of the EMU, as we can observe in the results of column (3). In this model the dummy *Euro* is once again not included and we only obtain satisfactory results for the political variable: the dummy *Election* is highly significant and suggests that budget balances will be lower in election years by more than 0.8 percent of GDP – a higher value than the one obtained for 1980-2012.

In order to understand the influence of Germany on the other country members' budget cycles we extend the analysis by including two more variables: *Weight*, computed as the percentage of the

country's real GDP relative to Germany's GDP; and Germany's Output Gap (denoted by *GER Output Gap*) to capture the influence of Germany business cycles. Table 4 presents the model including these two variables.

In column (1) we have the model for the period 1980-2012 and the results obtained are practically the same as in Table 3. However, in this case the variable *Corruption* and the two variables included do not present significant coefficients. The results for before the EMU are presented in column (2) and are very similar to the ones in Table 1. However, we have also that Germany's output gap influences negatively the budget balances of the member countries. Finally, in column (3) we present the results for after the EMU and we have that both *Weight* and Germany Output Gap present positive and highly significant coefficients. Moreover, the dummy *Election* maintains a negative and significant coefficient supporting once again the existence of PBCs after the EMU. It is also important to notice that during this period only the business cycles in Germany are affecting positively the budget balances, while before they were only affected positively by country's business cycles.

Table 4 – Estimation Results: All years, Before EMU and After EMU with Weight and Germany Output Gap

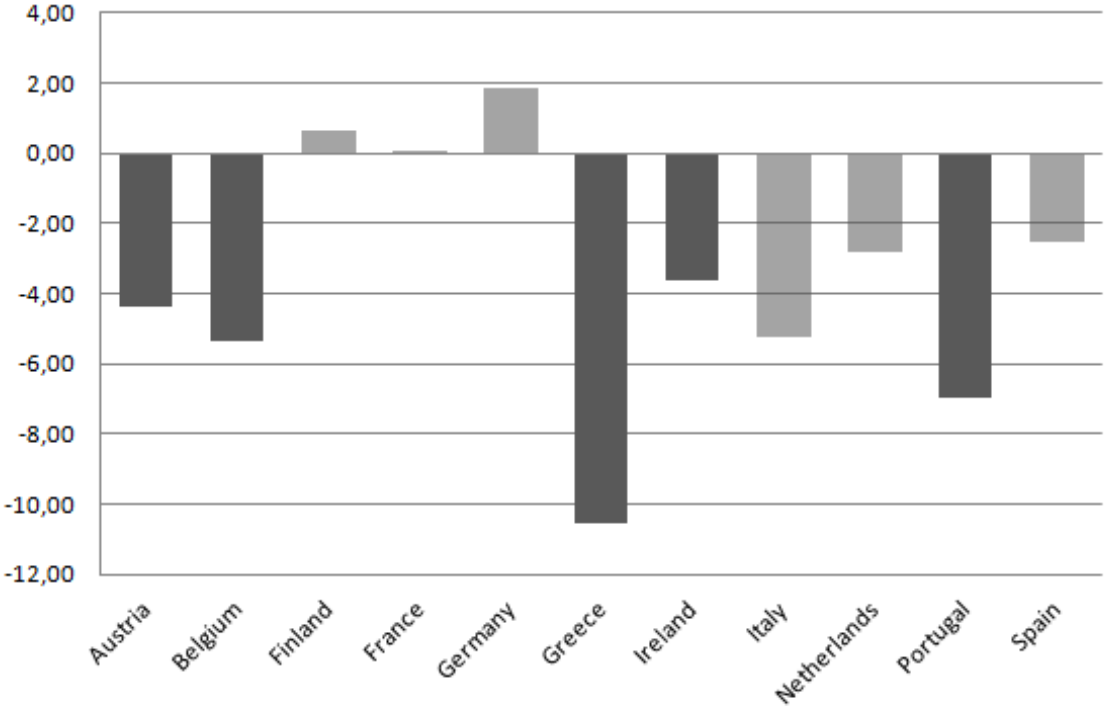
Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	0.591	0.911	-0.026
	(3.90)***	(6.25)***	(0.17)
CBI	3.772		
	(1.96)*		
Corruption	0.409	0.975	-0.098
	(1.63)	(2.48)**	(0.35)
Election	-0.635	-0.400	-0.779
	(2.10)**	(1.04)	(2.87)***
Euro	-5.145		
	(5.11)***		
Weight	-0.070	-0.141	0.691
	(0.68)	(1.34)	(4.76)***
GER Output Gap	-0.241	-0.422	0.975
	(1.43)	(2.56)**	(4.49)***
Constant	1.273	7.951	1.951
	(0.70)	(3.25)***	(1.14)
Observations	254	160	94
R-squared	0.75	0.77	0.89

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Furthermore, other important result to analyze is the significance of the country-dummies which are not reported in the table. In graph 6 we present the coefficients of these dummies. In this case, we observe that almost every country-dummy present a negative coefficient, with the exception of Finland, France and Germany. Moreover, it is also relevant to notice that not all the coefficients present a significant coefficient but larger ones in absolute value - Greece and Portugal - do.

Graph 6 – Country-Dummies in Equation (1) of Table 4



Note: The darker columns represent the country-dummies with significant coefficients and the lighter columns the non-significant ones. The dummy for Luxembourg is not included due to collinearity

Similarly to what was done in the last section, we extended this analysis by adding the two types of interaction variables: *euroElection*, e*uroCorruption* and *EuroCBI*, and *ElectCorruption* and *ElectCBI*. However, the results obtained were not satisfactory since none of these variables presented a significant coefficient. Moreover, when any one of these variables is included in the model the dummy *Election* no longer presents a significant coefficient. Thus, the model with these groups of interaction variables does not support the existence of political budget cycles – section 2 of appendix IV presents these estimation results.

For comparison purposes, in Tables 5 and 6 we present the estimation results of Table 4 without country- and year-dummies, respectively.

Table 5 – Estimation Results: All years, Before EMU and After EMU – without country-dummies

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	0.445	0.223	0.888
	(2.37)**	(0.90)	(3.66)***
CBI	0.522	0.405	
	(0.26)	(0.20)	
Corruption	-1.644	-2.129	-1.368
	(7.53)***	(5.56)***	(5.21)***
Election	-1.116	-1.009	-1.119
	(2.43)**	(1.47)	(2.19)**
Euro	4.160		
	(4.91)***		
Weight	-0.009	-0.003	-0.016
	(1.49)	(0.33)	(2.35)**
GER Output Gap	-0.256	-0.147	0.051
	(0.94)	(0.55)	(0.16)
Constant	-12.610	-15.336	-6.683
	(8.14)***	(7.20)***	(4.53)***
Observations	254	160	94
R-squared	0.42	0.29	0.48

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 5 presents the same estimation results as Table 4 but without country-dummies and observe relevant differences between the two. In column (1) we have that: *CBI* is no longer significant; *Corruption* presents here a negative and highly significant coefficient and, therefore, in line with the hypothesis of the theoretical model that more corrupt countries incur in higher deficits; lastly, the *Euro* dummy is once again significant but here presents a positive coefficient. The estimation results before the Economic and Monetary Union in Europe without the country-dummies are presented in column (2) and these are also different from the ones of Table 4. In this case, the only variable with satisfactory results is *Corruption* that, contrarily to the case of Table 4, presents positive and highly significant coefficient. Moreover, when country-dummies are not included *CBI* is not omitted due to collinearity before the EMU but does not present a significant coefficient. Finally, in column (3) we have the estimation results after EMU which once

again are extremely different from the ones with country-dummies included. In this case, both *Output Gap* and *Corruption* are significant while *GER Output Gap* no longer presents a significant coefficient. Moreover, although the variable *Weight* is still significant, here it presents the inverse sign meaning being a large economy relatively to Germany after the EMU no longer improves the budget balances.

Briefly, the estimation results change significantly when country-dummies are not included in the estimation particularly in what concerns the influence on budget balances of *Corruption* and the German economy. However, it does not changes the effects of elections on the fiscal outcomes since the dummy *Election* presents in both a negative and significant coefficient over the period 1980-2012 and after the EMU.

In conclusion, with this model we find empirical evidence of opportunistic budget cycles in twelve countries of the EMU - particularly after the countries have joined this common currency area - using general government budget balance as the fiscal policy indicator. We also concluded that central bank independence influences positively the fiscal policy, as was predicted in the theoretical model. Moreover, In addition, we obtain that Germany´s economic cycle plays a crucial role in individual country budget balances only after the adoption of the common currency. Also, the smaller the size of a country´s economy relative to that of Germany, the larger partner in the monetary union, the more fiscal policy-makers tend to indulge in budget deficits. Therefore, these results provide an important empirical support to the model options presented in the previous section.

6 Conclusion

We study the influence of CBI on opportunistic political budget cycles at both a theoretical and an empirical level. We construct a model inspired in the setting of Economic and Monetary Union in Europe (EMU) to capture the interplay between a shift of the level of Central Bank Independence on how the fiscal policy is set at the country level, before electoral periods. Firstly, we focus on the situation before the EMU and we present a model of opportunistic budget cycles with an independent central bank. The aim of the model is to understand what is driving political budget cycles in the presence of a central bank with varying degrees of independence. We find that the opportunistic PBCs are driven by two main reasons: the fact that the politician's welfare increases by being in office and the fact that good economic conditions in the year of election enhance the politician's prospects of reelection. We obtain that in case where each country has their own central bank it will be optimal for the politician to conduct expansionary fiscal policy

during electoral periods in the presence of a central bank with a lower level of independence.

In the second part, we extend the model to the setting of a monetary union, as in EMU, where monetary and fiscal policies are determined by two distinct authorities: a common central bank that sets monetary policy responding to the economic situation of the union as a whole, and an incumbent politician in a small country choosing fiscal policy in an election year. The key idea of this second model is to determine whether and how small countries in the union might take advantage of the fact that the one central bank may overlook the specific economic conditions of the small country, thus conducting opportunistic expansionary fiscal policies in electoral periods. We obtain that the political budget cycles in the EMU are driven by the same factors as in the benchmark model. However, the main difference lies on how the central bank independence level influences these PBCs. In the benchmark model the central bank is reacting only to the shocks of the small country, whereas in the EMU it is reacting to the shocks of the Union – or, as was assumed, to the shocks of the Large Country.

Furthermore, we were able to support empirically the main findings of our models through the study of twelve countries of EMU over the period 1980 to 2012. Using the general government budget balance as the fiscal policy indicator, we find empirical evidence of opportunistic PBCs, particularly after the countries have joined EMU. We also conclude that central bank independence influences positively fiscal policy - encouraging surpluses - as predicted in the theoretical model. In addition, we obtain that Germany´s economic cycle plays a crucial role in individual country budget balances only after the adoption of the common currency. Also, the smaller the size of a country´s economy relative to that of Germany, the larger partner in the monetary union, the more fiscal policy-makers tend to indulge in budget deficits. We interpret our results as suggestive of the line of research and the model options proposed in this thesis.

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Appendix I

Benchmark Model - One Country One Central Bank

1. The Monetary Authority

1.1 Optimal Monetary Policy under Discretion

The central bank is assumed to choose π in order to maximize the period losses subject to the aggregate supply relation. Thus, the problem of the Central Bank at each period is given by:

$$\max_{\pi_t} \quad c\gamma_t y_t - \alpha\frac{\pi_t^2}{2} \tag{92}$$

$$s.t. \qquad y_t^s = \lambda\left(\pi_t - \pi_t^e\right) \tag{93}$$

$$\max_{\pi_t} \quad c\gamma_t\left[\lambda\left(\pi_t - \pi_t^e\right)\right] - \alpha\frac{\pi_t^2}{2} \tag{94}$$

The first order condition is:

$$\frac{\partial\mathcal{L}^{CB}}{\partial\pi_t} = c\gamma_t\lambda - \alpha\pi_t = 0 \Leftrightarrow \tag{95}$$

$$\Leftrightarrow \pi_t = \frac{c\lambda}{\alpha}\gamma_t \tag{96}$$

2. Optimal Fiscal Policy

2.1 The Problem of the Politician

The desired fiscal policy of the incumbent is given by the maximization of her utility with respect to d subject to the aggregate supply, aggregate demand and government budget constraint:

$$\max_d U^P = \gamma_1 y_1 - \alpha\frac{\pi_1^2}{2} + \phi + \beta E_1\left\{\gamma_2 y_2 - \alpha\frac{\pi_2^2}{2} + p(y_1)\phi\right\} \tag{97}$$

$$\text{s.t.} \qquad \pi_1 = \frac{1}{\lambda}y_1^s + \pi_1^e \tag{98}$$

$$\pi_2 = \frac{1}{\lambda}y_2^s + \pi_2^e \tag{99}$$

$$y_1^d = mg_1 \tag{100}$$

$$y_2^d = mg_2 \tag{101}$$

$$g_1 = d \tag{102}$$

$$g_2 = -(1+i^l)d \tag{103}$$

Substituting the government budget constraint into the aggregate demand we obtain:

$$\max_d U^P = \gamma_1 y_1 - \alpha\frac{\pi_1^2}{2} + \phi + \beta E_1\left\{\gamma_2 y_2 - \alpha\frac{\pi_2^2}{2} + p(y_1)\phi\right\} \tag{104}$$

$$\text{s.t.} \qquad \pi_1 = \frac{1}{\lambda}y_1^s + \pi_1^e \tag{105}$$

$$\pi_2 = \frac{1}{\lambda}y_2^s + \pi_2^e \tag{106}$$

$$y_1^d = md \tag{107}$$

$$y_2^d = -(1+i^l)md \tag{108}$$

In equilibrium $y^s = y^d$ we have:

$$\max_d U^P = \gamma_1 y_1 - \alpha\frac{\pi_1^2}{2} + \phi + \beta E_1\left\{\gamma_2 y_2 - \alpha\frac{\pi_2^2}{2} + p(y_1)\phi\right\} \tag{109}$$

$$\text{s.t.} \qquad \pi_1 = \frac{1}{\lambda}md + \pi_1^e \tag{110}$$

$$\pi_2 = -\frac{1}{\lambda}(1+i^l)md + \pi_2^e \tag{111}$$

$$y_1 = md \tag{112}$$

$$y_2 = -(1+i^l)md \tag{113}$$

Substituting the constraints into the objective function, the incumbent's problem becomes:

$$\max_d U^P = \gamma_1 md - \alpha\frac{\left[\frac{1}{\lambda}md + \pi_1^e\right]^2}{2} + \phi + \beta E_1\left\{\gamma_2\left[-(1+i^l)md\right] - \alpha\frac{\left[-\frac{1}{\lambda}(1+i^l)md + \pi_2^e\right]^2}{2} + p(y_1)\phi\right\} \tag{114}$$

The first order conditions:

$$\begin{aligned}
&d: \frac{\partial U^P}{\partial d} = 0 \Leftrightarrow \\
&\Leftrightarrow \gamma_1 m - \alpha\frac{1}{\lambda}m\left[\frac{1}{\lambda}md + \pi_1^e\right] + \beta E_1\left\{-(1+i^l)m\gamma_2 + \frac{1}{\lambda}\alpha(1+i^l)m\left[-\frac{1}{\lambda}(1+i^l)md + \pi_2^e\right] + \frac{\partial p(y_1)}{\partial y_1}\frac{\partial y_1}{\partial d}\phi\right\} = 0 \\
&\Leftrightarrow \gamma_1 - \alpha\frac{1}{\lambda^2}md - \alpha\frac{1}{\lambda}\pi_1^e + \beta E_1\left\{-(1+i^l)\gamma_2 - \frac{1}{\lambda^2}\alpha(1+i^l)^2md + \frac{1}{\lambda}\alpha(1+i^l)\pi_2^e + \frac{\partial p(y_1)}{\partial y_1}\phi\right\} = 0 \\
&\Leftrightarrow d = \frac{\lambda^2}{m\alpha\left[1+(1+i^l)^2\beta\right]}\left[\beta\frac{\partial p(y_1)}{\partial y_1}\phi + \gamma_1 - \frac{\alpha}{\lambda}\pi_1^e - (1+i^l)\beta\overline{\gamma}_2 + \frac{\alpha}{\lambda}(1+i^l)\beta\pi_2^e\right]
\end{aligned}$$

Appendix II

Opportunistic Budget Cycles in the European Monetary Union

1. The Monetary Authority

1.1 Optimal Monetary Policy under Discretion

The central bank is assumed to choose π in order to minimize the period losses subject to the aggregate supply relation. Thus, the problem of the Central Bank at each period is given by:

$$\max_{\pi_t} \quad c\gamma_t^U y_t^U - \alpha \frac{\left(\pi_t^U\right)^2}{2} \tag{115}$$

$$s.t. \qquad \left(y_t^U\right)^s = \lambda\left(\pi_t^U - \left(\pi_t^e\right)^U\right) \tag{116}$$

$$\max_{\pi_t} \quad c\gamma_t^U\left[\lambda\left(\pi_t^U - \left(\pi_t^e\right)^U\right)\right] - \alpha \frac{\left(\pi_t^U\right)^2}{2} \tag{117}$$

The first order condition is:

$$\frac{\partial \mathcal{L}^{CB}}{\partial \pi_t^U} = c\gamma_t^U \lambda - \alpha \pi_t^U = 0 \Leftrightarrow \tag{118}$$

$$\Leftrightarrow \pi_t^U = \frac{c\lambda}{\alpha}\gamma_t^U \tag{119}$$

2. Optimal Fiscal Policy

2.1 The Problem of the Politician

The desired fiscal policy of the incumbent is given by the maximization of her utility with respect to d_i subject to the aggregate supply, aggregate demand and government budget constraint:

$$\max_{d_i} U_i^P = \gamma_{i,t} y_{i,1} - \alpha \frac{\pi_{i,1}^2}{2} + \phi_i + \beta E_1\left\{\gamma_{i,t} y_{i,2} - \alpha \frac{\pi_{i,2}^2}{2} + p(y_{i,1})\phi_i\right\} \tag{120}$$

$$\text{s.t.} \quad \pi_{i,1} = \frac{1}{\lambda} y_{i,1}^s + \pi_{i,1}^e \tag{121}$$

$$\pi_{i,2} = \frac{1}{\lambda} y_{i,2}^s + \pi_{i,2}^e \tag{122}$$

$$y_{i,1}^s = m_i g_{i,1} \tag{123}$$

$$y_{i,2}^s = m_i g_{i,2} \tag{124}$$

$$g_{i,1} = d_i \tag{125}$$

$$g_{i,2} = -(1 + i_i^l) d_i \tag{126}$$

ubstituting the government budget constraint into the aggregate demand we obtain:

$$\max_{d_i} U_i^P = \gamma_{i,t} y_{i,1} - \alpha \frac{\pi_{i,1}^2}{2} + \phi_i + \beta E_1 \left\{ \gamma_{i,t} y_{i,2} - \alpha \frac{\pi_{i,2}^2}{2} + p(y_{i,1}) \phi_i \right\} \tag{127}$$

$$\text{s.t.} \quad \pi_{i,1} = \frac{1}{\lambda} y_{i,1}^s + \pi_{i,1}^e \tag{128}$$

$$\pi_{i,2} = \frac{1}{\lambda} y_{i,2}^s + \pi_{i,2}^e \tag{129}$$

$$y_{i,1}^s = m_i d_i \tag{130}$$

$$y_{i,2}^s = -m_i (1 + i_i^l) d_i \tag{131}$$

In equilibrium $y^s = y^d$ we have:

$$\max_{d_i} U_i^P = \gamma_{i,t} y_{i,1} - \alpha \frac{\pi_{i,1}^2}{2} + \phi_i + \beta E_1 \left\{ \gamma_{i,t} y_{i,2} - \alpha \frac{\pi_{i,2}^2}{2} + p(y_{i,1}) \phi_i \right\} \tag{132}$$

$$\text{s.t.} \quad \pi_{i,1} = \frac{1}{\lambda} m_i d_i + \pi_{i,1}^e \tag{133}$$

$$\pi_{i,2} = -\frac{1}{\lambda} m_i (1 + i_i^l) d_i + \pi_{i,2}^e \tag{134}$$

Substituting the constraints into the objective function, the incumbent's problem becomes:

$$\max_{d_i} U_i^P = \gamma_{i,1} m_i d_i - \alpha \frac{\left[\frac{1}{\lambda} m_i d_i + \pi_{i,1}^e \right]^2}{2} + \phi_i + \beta E_1 \left\{ \gamma_{i,2} \left[-(1 + i^l) m_i d_i \right] - \alpha \frac{\left[-\frac{1}{\lambda} (1 + i^l) m_i d_i + \pi_{i,2}^e \right]^2}{2} + p(y_{i,1}) \phi_i \right\}$$

The first order conditions:

$$\begin{aligned}
d_i : \frac{\partial U_i^P}{\partial d} &= 0 \\
&\Leftrightarrow \gamma_{i,1} - \alpha \frac{1}{\lambda^2} m_i d_i - \alpha \frac{1}{\lambda} \pi_{i,1}^e + \beta E_1 \left\{ -(1 + i_i^l) \gamma_{i,2} - \frac{1}{\lambda^2} \alpha (1 + i_i^l)^2 m_i d_i + \frac{1}{\lambda} \alpha (1 + i_i^l) \pi_{i,2}^e + \frac{\partial p(y_{i,1})}{\partial y_{i,1}} \phi_i \right\} = 0 \\
&\Leftrightarrow d_i = \frac{\lambda^2}{m_i \alpha \left[1 + (1 + i_i^l)^2 \beta \right]} \left[\beta \frac{\partial p(y_{i,1})}{\partial y_{i,1}} \phi_i + \gamma_{i,1} - \frac{\alpha}{\lambda} \pi_{i,1}^e - (1 + i_i^l) \beta \overline{\gamma}_{i,2} + \frac{\alpha}{\lambda} (1 + i_i^l) \beta \pi_{i,2}^e \right]
\end{aligned}$$

Appendix III

Definitions and sources of the data

Budget Balance

General government net borrowing / net lending as % of GDP. Data have been corrected for one-off UMTS receipts.

Unit: Percentage of GDP at market prices (excessive deficit procedure).

Source: the European Commission Ameco.

Output Gap

Gap between actual and potential gross domestic product at constant market prices.

Unit: Percentage of potential gross domestic product at market prices.

Source: the European Commission Ameco.

CBI

Central bank independence index computed by Crowe and Meade (2007) and based on the Cukierman, Webb and Neyapti (1992) index (CWN index). The CWN index has four components: appointment procedures for the head of the central bank; the resolution of conflict between the central bank and the executive branch of government; the use of an explicit policy target; and rules limiting lending to government.

Unit: 0 to 1 points (0 being the lowest level of CBI and 1 the highest).

Source: Data used in Crowe and Meade (2007).

Corruption

The symmetric of the International Country Risk Guide Corruption index over the period from 1984 to 2006.

Unit: -6 to 0 points, 0 points being the maximum level perceived of corruption and -6 the lowest.

Source: the PRS Group.

Election

Dummy with value 1 in years in which parliamentary elections have taken place

Source: IDEA (Institute for Democracy and Electoral Assistance, "Voter Turnout").

Euro

Dummy taking value 1 in 1999-2012, and 0 otherwise (except for Greece, taking value 1 in 2001-2012, and 0 otherwise).

Weight

The country's real gross domestic product as a percentage of Germany's real GDP.

Unit: Percentage.

GER Output Gap

Output gap in Germany computed as the gap between actual and potential gross domestic product at constant market prices.

Unit: Percentage of potential gross domestic product at market prices.

Source: the European Commission Ameco.

Primary Budget Balance (Primary BB)

General government net borrowing / net lending excluding interest as % of GDP. Data have been corrected for one-off UMTS receipts.

Unit: Percentage of GDP at market prices (excessive deficit procedure).

Source: the European Commission Ameco.

Debt

General government consolidated gross debt as % of GDP.

Unit: Percentage of GDP at market prices (excessive deficit procedure).

Source: the European Commission Ameco.

Debt GR

Annual growth rate of the general government consolidated gross debt as % of GDP.

Unit: Percentage.

Output Gap^{Trend}

Gap between actual and trend gross domestic product at constant market prices. To obtain estimates for the output trend, the cyclical adjustment method applies the Hodrick-Prescott filter to the actual output series.

Unit: Percentage of trend gross domestic product at market prices.

Source: European Commission Ameco.

Real GDP growth

Annual growth rate of the gross domestic product at constant market prices.

Unit: Percentage.

Source: the OECD Economic Outlook database and the European Commission Ameco.

Appendix IV

1. Estimation Results with Primary Budget Balance as Dependent Variable

Table 1 – Estimation Results: 1980-2012

Dependent Variable: Primary BB

Equation No.	(1)	(2)	(3)	(4)	(5)
Output Gap	0.340	0.340	0.395	0.386	0.391
	(2.58)**	(2.57)**	(2.89)***	(2.79)***	(2.83)***
CBI		0.106	1.079	1.086	2.653
		(0.08)	(0.60)	(0.61)	(1.61)
Corruption			-0.039	-0.055	0.032
			(0.16)	(0.23)	(0.13)
Election				-0.523	-0.538
				(1.78)*	(1.87)*
Euro					-3.971
					(4.10)***
Constant	1.370	1.303	0.733	0.931	0.885
	(1.99)**	(1.30)	(0.40)	(0.51)	(0.49)
Observations	358	358	254	254	254
R-squared	0.50	0.50	0.52	0.53	0.54

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 2 – Estimation Results: 1980-2012 – Comparing with and without country and year-dummies

Dependent Variable: Primary BB

	Country- and Year-Dummies	Only Country-Dummies	Only Year-Dummies	Without Country- and Year-Dummies
Equation No.	(1)	(2)	(3)	(4)
Output Gap	0.391	0.445	0.353	0.423
	(2.83)***	(5.31)***	(2.61)***	(4.43)***
CBI	2.653	2.509	-2.260	-2.245
	(1.61)	(1.49)	(1.67)*	(1.67)*
Corruption	0.032	0.203	-0.503	-0.420
	(0.13)	(0.93)	(2.92)***	(2.26)**
Election	-0.538	-0.542	-0.678	-0.666
	(1.87)*	(1.81)*	(1.83)*	(1.84)*
Euro	-3.971	-1.048	0.101	1.651
	(4.10)***	(1.46)	(0.14)	(2.53)**
Constant	0.885	2.501	-0.365	0.335
	(0.49)	(1.53)	(0.28)	(0.28)
Observations	254	254	254	254
R-squared	0.54	0.44	0.25	0.14

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 3 – Estimation Results: All years, Before EMU and After EMU

Dependent Variable: Primary BB

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	0.391	0.619	0.031
	(2.83)***	(4.13)***	(0.20)
CBI	2.653		
	(1.61)		
Corruption	0.032	0.954	-0.262
	(0.13)	(2.56)**	(0.89)
Election	-0.538	-0.338	-0.828
	(1.87)*	(0.86)	(2.76)***
Euro	-3.971		
	(4.10)***		
Constant	0.885	7.942	0.379
	(0.49)	(3.35)***	(0.24)
Observations	254	160	94
R-squared	0.54	0.49	0.84

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 4 – Estimation Results: All years, before EMU and after EMU

Dependent Variable: Primary BB

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	0.489	0.712	-0.179
	(3.69)***	(5.41)***	(1.16)
CBI	1.753		
	(1.10)		
Corruption	-0.073	0.698	-0.197
	(0.29)	(1.82)*	(0.64)
Election	-0.576	-0.398	-0.782
	(1.96)*	(0.98)	(2.89)***
Euro	-3.688		
	(3.73)***		
Weight	-0.254	-0.329	0.678
	(2.80)***	(3.04)***	(5.05)***
GER Output Gap	-0.242	-0.368	1.389
	(1.79)*	(2.68)***	(6.18)***
Constant	1.034	7.104	2.255
	(0.58)	(2.98)***	(1.28)
Observations	254	160	94
R-squared	0.56	0.53	0.87

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 5 – Estimation Results: All years, Before EMU and After EMU – without country-dummies

Dependent Variable: Primary BB

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	0.357	0.453	0.199
	(2.68)***	(2.81)***	(0.85)
CBI	-1.748	-1.671	
	(1.32)	(1.24)	
Corruption	-0.347	-0.064	-0.565
	(2.08)**	(0.26)	(2.34)**
Election	-0.693	-0.497	-1.088
	(1.89)	(1.03)	(1.91)
Euro	0.280		
	(0.38)		
Weight	-0.020	-0.024	-0.015
	(4.52)***	(3.93)***	(2.34)**
GER Output Gap	-0.123	-0.153	0.863
	(0.78)	(0.90)	(2.65)***
Constant	0.712	2.159	0.979
	(0.62)	(1.39)	(0.68)
Observations	254	160	94
R-squared	0.30	0.26	0.37

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

2. Estimation Results with Debt Growth Rate as Dependent Variable

Table 1 – Estimation Results: 1980-2012

Dependent Variable: Debt GR

Equation No.	(1)	(2)	(3)	(4)	(5)
Output Gap	-2.121	-2.125	-2.896	-2.868	-2.866
	(3.12)***	(3.11)***	(3.38)***	(3.35)***	(3.34)***
CBI		1.302	2.564	2.612	3.462
		(0.32)	(0.63)	(0.67)	(0.82)
Corruption			1.140	1.196	1.248
			(1.44)	(1.53)	(1.59)
Election				1.978	1.970
				(1.88)*	(1.87)*
Euro					-2.168
					(0.65)
Constant	1.985	1.222	3.550	3.068	3.088
	(0.48)	(0.28)	(0.67)	(0.58)	(0.59)
Observations	383	383	275	275	275
R-squared	0.39	0.39	0.49	0.50	0.50

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 2 – Estimation Results: 1980-2012 – Comparing with and without country and year-dummies

Dependent Variable: Debt GR

	Country- and Year-Dummies	Only Country-Dummies	Only Year-Dummies	Without Country- and Year-Dummies
Equation No.	(1)	(2)	(3)	(4)
Output Gap	-2.866	-2.100	-2.574	-2.002
	(3.34)***	(4.97)***	(2.89)***	(4.47)***
CBI	3.462	0.020	-0.647	-1.243
	(0.82)	(0.00)	(0.20)	(0.31)
Corruption	1.248	-0.193	0.515	-0.054
	(1.59)	(0.29)	(1.14)	(0.09)
Election	1.970	1.466	2.038	1.609
	(1.87)*	(1.28)	(1.74)*	(1.28)
Euro	-2.168	-1.980	-4.702	-1.825
	(0.65)	(1.19)	(1.38)	(0.88)
Constant	3.088	-0.915	1.864	2.480
	(0.59)	(0.16)	(0.60)	(1.09)
Observations	275	275	275	275
R-squared	0.50	0.32	0.39	0.21

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 3 – Estimation Results: All years, Before EMU and After EMU

Dependent Variable: Debt GR

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	-2.866	-3.660	-1.172
	(3.34)***	(3.49)***	(2.28)**
CBI	3.462		
	(0.82)		
Corruption	1.248	0.311	1.168
	(1.59)	(0.37)	(1.18)
Election	1.970	2.000	1.055
	(1.87)	(1.37)	(1.26)
Euro	-2.168		
	(0.65)		
Constant	3.088	-5.309	7.225
	(0.59)	(0.89)	(1.35)
Observations	275	181	94
R-squared	0.50	0.53	0.61

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 4 – Estimation Results: All years, before EMU and after EMU with Weight and Germany Output Gap

Dependent Variable: Debt GR

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	-3.074	-3.907	-1.052
	(3.30)***	(3.62)***	(1.88)*
CBI	4.505		
	(1.02)		
Corruption	1.508	0.839	1.131
	(1.73)*	(0.96)	(1.14)
Election	2.042	2.143	1.029
	(1.93)*	(1.47)	(1.24)
Euro	-2.584		
	(0.78)		
Weight	0.529	0.861	-0.385
	(1.66)*	(2.47)**	(0.67)
GER Output Gap	2.246	2.792	-0.695
	(2.11)**	(2.66)***	(1.26)
Constant	6.710	0.154	6.087
	(1.17)	(0.03)	(1.10)
Observations	275	181	94
R-squared	0.51	0.55	0.61

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 5 – Estimation Results: All years, Before EMU and After EMU – without country-dummies

Dependent Variable: Debt GR

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap	-2.583	-3.122	-0.969
	(2.88)***	(2.70)***	(1.93)*
CBI	-1.244	-0.914	
	(0.39)	(0.28)	
Corruption	0.301	0.044	0.020
	(0.67)	(0.05)	(0.04)
Election	2.047	2.316	1.522
	(1.74)*	(1.34)	(1.37)
Euro	-5.029		
	(1.46)		
Weight	0.029	0.038	0.028
	(2.50)**	(2.47)**	(1.94)*
GER Output Gap	1.746	2.025	-0.598
	(1.71)*	(1.83)*	(1.00)
Constant	3.141	1.232	-3.144
	(1.16)	(0.32)	(1.02)
Observations	275	181	94
R-squared	0.40	0.40	0.24

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

3. Estimation Results with Output Gap based on trend GDP

Table 1 – Estimation Results: 1980-2012

Dependent Variable: Budget Balance

Equation No.	(1)	(2)	(3)	(4)	(5)
Output Gap^{Trend}	0.316	0.311	0.362	0.355	0.392
	(2.43)**	(2.39)**	(3.34)***	(3.26)***	(3.65)***
CBI		3.540	4.072	4.041	6.470
		(2.37)**	(1.99)**	(1.99)**	(3.66)***
Corruption			0.259	0.241	0.367
			(1.00)	(0.93)	(1.41)
Election				-0.618	-0.635
				(1.95)*	(2.12)**
Euro					-6.232
					(5.87)***
Constant	0.685	-1.555	0.113	0.371	0.280
	(0.92)	(1.37)	(0.06)	(0.19)	(0.15)
Observations	358	358	254	254	254
R-squared	0.63	0.63	0.73	0.74	0.75

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 2 – Estimation Results: 1980-2012 – Comparing with and without country and year-dummies

Dependent Variable: Budget Balance

	Country- and Year-Dummies	Only Country-Dummies	Only Year-Dummies	Without Country- and Year-Dummies
Equation No.	(1)	(2)	(3)	(4)
Output Gap^{Trend}	0.392	0.294	0.520	0.333
	(3.65)***	(3.48)***	(3.44)***	(2.93)***
CBI	6.470	6.603	0.864	0.682
	(3.66)***	(3.59)***	(0.46)	(0.37)
Corruption	0.367	0.724	-1.652	-1.412
	(1.41)	(2.70)***	(7.77)***	(5.92)***
Election	-0.635	-0.732	-1.064	-1.156
	(2.12)**	(2.25)**	(2.35)**	(2.53)**
Euro	-6.232	-0.981	2.677	3.843
	(5.87)***	(1.27)	(2.96)***	(4.34)***
Constant	0.280	2.824	-12.338	-11.165
	(0.15)	(1.46)	(7.33)***	(7.53)***
Observations	254	254	254	254
R-squared	0.75	0.66	0.44	0.32

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 3 – Estimation Results: All years, Before EMU and After EMU

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap^{Trend}	0.392	0.459	0.077
	(3.65)***	(3.31)***	(0.61)
CBI	6.470		
	(3.66)***		
Corruption	0.367	0.990	-0.155
	(1.41)	(2.60)**	(0.57)
Election	-0.635	-0.459	-0.821
	(2.12)**	(1.17)	(2.66)***
Euro	-6.232		
	(5.87)***		
Constant	0.280	7.445	0.902
	(0.15)	(3.04)***	(0.58)
Observations	254	160	94
R-squared	0.75	0.74	0.87

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 4 – Estimation Results: All years, Before EMU and After EMU with Weight and Germany Output Gap

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap^{Trend}	0.400	0.461	-0.184
	(3.51)***	(3.27)***	(1.72)*
CBI	6.400		
	(3.67)***		
Corruption	0.350	0.964	-0.014
	(1.30)	(2.45)**	(0.05)
Election	-0.641	-0.466	-0.789
	(2.12)**	(1.17)	(2.96)***
Euro	-6.211		
	(5.86)***		
Weight	-0.038	-0.031	0.810
	(0.35)	(0.28)	(4.92)***
GER Output Gap^{Trend}	-0.177	-0.201	0.697
	(1.09)	(1.22)	(4.11)***
Constant	-0.176	6.828	1.393
	(0.09)	(2.81)***	(0.84)
Observations	254	160	94
R-squared	0.75	0.74	0.90

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 5 – Estimation Results: All years, Before EMU and After EMU – without country-dummies

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
Output Gap^{Trend}	0.520	0.426	0.680
	(3.52)***	(2.32)**	(2.92)***
CBI	1.100	0.840	
	(0.59)	(0.45)	
Corruption	-1.580	-1.982	-1.325
	(7.44)***	(5.54)***	(5.21)***
Election	-1.071	-0.974	-1.096
	(2.35)**	(1.43)	(2.05)**
Euro	2.761		
	(3.03)***		
Weight	-0.009	-0.006	-0.011
	(1.45)	(0.64)	(1.57)
GER Output Gap^{Trend}	-0.320	-0.269	0.161
	(1.39)	(1.15)	(0.54)
Constant	-12.669	-14.775	-6.835
	(8.36)***	(7.04)***	(5.30)***
Observations	254	160	94
R-squared	0.45	0.32	0.46

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

4. Estimation Results with real GDP growth rate

Table 1 – Estimation Results: 1980-2012

Dependent Variable: Budget Balance

Equation No.	(1)	(2)	(3)	(4)	(5)
GDP GR	0.395	0.443	0.284	0.274	0.279
	(2.96)***	(3.25)***	(2.59)**	(2.46)**	(2.52)**
CBI		5.079	4.593	4.552	6.612
		(3.33)***	(2.36)**	(2.36)**	(3.80)***
Corruption			0.304	0.286	0.398
			(1.23)	(1.15)	(1.59)
Election				-0.629	-0.648
				(2.01)**	(2.15)**
Euro					-5.146
					(5.20)***
Constant	-0.647	-3.963	-1.686	-1.360	-1.464
	(0.76)	(3.07)***	(0.84)	(0.67)	(0.72)
Observations	358	358	254	254	254
R-squared	0.64	0.65	0.72	0.72	0.73

Note: Absolute value of t-statistics in parentheses. ***, *** and ** denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 2 – Estimation Results: 1980-2012 – Comparing with and without country and year-dummies

Dependent Variable: Budget Balance

	Country- and Year-Dummies	Only Country-Dummies	Only Year-Dummies	Without Country- and Year-Dummies
Equation No.	(1)	(2)	(3)	(4)
GDP GR	0.279	0.416	0.551	0.611
	(2.52)**	(4.74)***	(4.48)***	(6.07)***
CBI	6.612	6.691	0.583	0.431
	(3.80)***	(3.76)***	(0.31)	(0.24)
Corruption	0.398	0.552	-1.667	-1.522
	(1.59)	(2.14)**	(8.04)***	(6.97)***
Election	-0.648	-0.764	-0.998	-1.115
	(2.15)**	(2.41)**	(2.40)**	(2.66)***
Euro	-5.146	-0.357	4.282	4.541
	(5.20)***	(0.50)	(4.71)***	(5.46)***
Constant	-1.464	-0.212	-14.895	-13.663
	(0.72)	(0.11)	(9.01)***	(10.32)***
Observations	254	254	254	254
R-squared	0.73	0.68	0.46	0.40

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 3 – Estimation Results: All years, Before EMU and After EMU

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
GDP GR	0.279	0.270	0.157
	(2.52)**	(1.95)*	(1.04)
CBI	6.612		
	(3.80)***		
Corruption	0.398	0.837	-0.141
	(1.59)	(2.24)**	(0.55)
Election	-0.648	-0.438	-0.830
	(2.15)**	(1.08)	(2.74)***
Euro	-5.146		
	(5.20)***		
Constant	-1.464	4.839	2.340
	(0.72)	(2.01)**	(1.05)
Observations	254	160	94
R-squared	0.73	0.71	0.88

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 4 – Estimation Results: All years, Before EMU and After EMU with Weight and Germany Output Gap

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
GDP GR	0.278	0.277	0.133
	(2.52)**	(1.99)**	(0.92)
CBI	6.626		
	(3.84)***		
Corruption	0.401	0.802	-0.124
	(1.59)	(2.02)**	(0.47)
Election	-0.647	-0.446	-0.780
	(2.14)**	(1.08)	(2.96)***
Euro	-5.156		
	(5.19)***		
Weight	0.008	-0.041	0.670
	(0.08)	(0.40)	(4.71)***
GER GDP GR	0.225	0.212	0.163
	(0.71)	(0.76)	(1.42)
Constant	-1.780	4.450	-0.317
	(0.84)	(1.78)*	(0.18)
Observations	254	160	94
R-squared	0.73	0.71	0.90

Note: Absolute value of t-statistics in parentheses. ***, *** and ** denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 5 – Estimation Results: All years, Before EMU and After EMU – without country-dummies

Dependent Variable: Budget Balance

	All Years	Before EMU	After EMU
Equation No.	(1)	(2)	(3)
GDP GR	0.562	0.464	0.724
	(4.02)***	(2.63)***	(4.89)***
CBI	0.528	0.308	
	(0.28)	(0.16)	
Corruption	-1.683	-2.146	-1.338
	(8.16)***	(5.48)***	(5.93)***
Election	-0.993	-0.883	-0.985
	(2.40)**	(1.41)	(2.09)**
Euro	4.256		
	(4.55)***		
Weight	0.002	0.004	-0.000
	(0.29)	(0.52)	(0.05)
GER GDP GR	0.045	0.062	-0.120
	(0.09)	(0.13)	(0.48)
Constant	-15.121	-17.245	-8.101
	(7.41)***	(6.92)***	(6.61)***
Observations	254	160	94
R-squared	0.46	0.33	0.53

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

5. Estimation Results: Pooled Least Squares, Fixed Effects and Random Effects

Table 1 – Estimation Results: 1980-2012

Dependent Variable: Budget Balance

Equation No.	Pooled LS		FE		RE	
Output Gap	0.564	0.591	0.564	0.591	0.564	0.591
	(4.87)***	(4.89)***	(4.87)***	(4.89)***	(4.87)***	(4.89)***
CBI	4.020	3.772	4.020	3.772	4.020	3.772
	(1.99)**	(1.84)*	(1.99)**	(1.84)*	(1.99)**	(1.84)*
Corruption	0.438	0.409	0.438	0.409	0.438	0.409
	(1.73)*	(1.60)	(1.73)*	(1.60)	(1.73)*	(1.60)
Election	-0.624	-0.635	-0.624	-0.635	-0.624	-0.635
	(1.89)*	(1.92)*	(1.89)*	(1.92)*	(1.89)*	(1.92)*
Euro	-5.223	-5.145	-5.223	-5.145	-5.223	-5.145
	(2.78)***	(2.73)***	(2.78)***	(2.73)***	(2.78)***	(2.73)***
Weight		-0.070		-0.070		-0.070
		(0.79)		(0.79)		(0.79)
GER Output Gap		-0.241		-0.241		3.229
		(1.32)		(1.32)		(3.07)***
Constant	1.532	1.273	-3.707	-1.943	1.532	7.221
	(0.79)	(0.68)	(2.14)**	(0.62)	(0.79)	(2.86)***
Observations	254	254	254	254	254	254
R-squared	0.75	0.75	0.53	0.53		

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table.

6. Estimation Results including the Interaction Variables

Table 1 – Estimation Results: 1980-2012 with EURO Interaction Variables

Dependent Variable: Primary BB

Equation No.	(1)	(2)	(3)	(4)
Output Gap	0.558	0.558	0.541	0.555
	(3.78)***	(3.78)***	(3.64)***	(3.72)***
CBI	1.959	1.964	2.879	3.895
	(0.92)	(0.93)	(1.53)	(1.98)**
Corruption	0.323	0.324	-0.004	0.257
	(1.34)	(1.33)	(0.02)	(0.78)
Election	-0.605	-0.426	-0.459	-0.524
	(1.94)*	(1.05)	(1.14)	(1.31)
EuroElection		-0.489	-0.354	-0.240
		(0.80)	(0.59)	(0.40)
EuroCorruption			0.591	0.272
			(2.62)***	(0.89)
EuroCBI				-4.608
				(2.10)**
Constant	1.592	1.484	-0.526	0.555
	(0.84)	(0.78)	(0.25)	(0.25)
Observations	254	254	254	254
R-squared	0.74	0.74	0.75	0.75

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.

Table 2 – Estimation Results: 1980-2012 with ELECTION Interaction Variables

Dependent Variable: Primary BB

Equation No.	(1)	(2)	(3)	(4)
Output Gap	0.558	0.557	0.557	0.556
	(3.78)***	(3.76)***	(3.78)***	(3.75)***
CBI	1.959	1.962	2.122	2.163
	(0.92)	(0.92)	(0.98)	(1.00)
Corruption	0.323	0.320	0.320	0.303
	(1.34)	(1.28)	(1.32)	(1.20)
Election	-0.605	-0.525	-0.185	0.290
	(1.94)*	(0.37)	(0.22)	(0.17)
electcorr		0.017		0.086
		(0.05)		(0.28)
electCBI			-0.740	-0.862
			(0.56)	(0.66)
Constant	1.592	1.576	1.430	1.322
	(0.84)	(0.83)	(0.74)	(0.67)
Observations	254	254	254	254
R-squared	0.74	0.74	0.74	0.74

Note: Absolute value of t-statistics in parentheses. ***, ** and * denote significance at 1%, 5% and 10% level, respectively. The estimated regressions included country-specific and year-specific dummies which are not reported in the table. Estimations were computed using White robust estimators.